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Cod Fishing in Alaska.

A correspondent of the Alaska *Herald*, published at San Francisco, writes from the Shumagin Islands the following particulars. The Shumagins are a group of small islands situated near the 55th parallel, half way out on the peninsula of Alaska. They are among the possessions ceded to the United States by Russia.

There has been a great deal of rough weather along the Shumagin Islands during the summer. The strong south and southeasterly winds are the most severe here, and often prevent the fleet from carrying on operations. The storms brought by these winds are not infrequent, and compel vessels to leave their anchorage for sea. The atmosphere is thick with fogs and the rains are constant and heavy during these winds. The sun is seldom seen, and for the past three months has appeared only twice. You may rest assured that when we do see "the divine light of heaven," as the poets have it, the heart goes out in thanks for the small favor granted. A good sun bath is a luxury we do not often indulge in and which can only be properly appreciated by people in our situation.

Speaking of the winds, it is a strange fact that what we call the south winds are the the coldest and chilliest that we endure. These are the winds that bring us our severest storms, foggiest weather, and heaviest rains. In other countries, the south winds bring calm, warm, and beautiful weather. There must be a wind whirlpool, somewhere along the Aleutian coast, which changes the current of the air and the temperature of the climate. Perhaps, as the lovers of science advance this way, they may be able to discover the causes which make our south winds feel as if they came right from the north pole. In this as in a thousand other matters of great scientific interest, Alaska offers an inviting field of observation.

The few Americans on the islands are not, however, so much interested in science as they are in codfish. In catching the latter and making it marketable, their time, during the fishing season, is pretty well occupied. From daylight until dark—and daylight and darkness are considerably mixed here—the hands are engaged in catching and salting.

Codfish are taken by men in small boats, who go to the fishing grounds and bait for their harvest of the sea. They fish with lines, and use what are known as eleven and twelve inch hooks. Halibut and cuttle fish are the best bait. A good fisherman, if he is lucky, will haul up 400 codfish in a day, and this is considered a splendid catch; to procure 300 on an average every day is very satisfactory. Having brought the catch on board, the fish are immediately salted, packed away, and are not again touched until the cargo lands at its destination.

White men make better fishermen than the Aleuts, although the latter, when they are trained, do very well.

It may seem to your readers that life on this coast cannot be very enjoyable; and yet the white men here appear to be as happy as they could hope to be anywhere in the world. You hear very little growling or complaining. Our wants are few, and we scarcely know what care is.

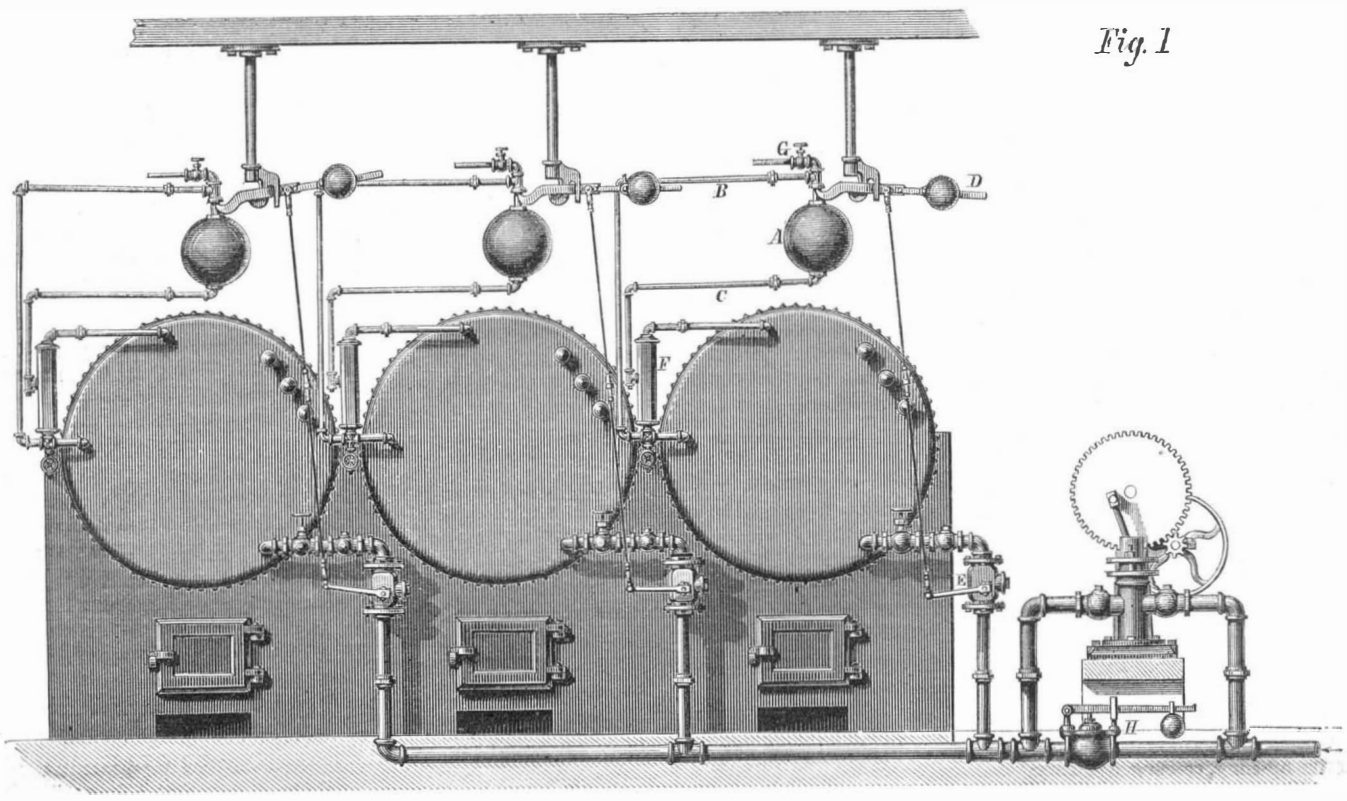
THE use of red light in photography has been found to hasten impressions and increase their sharpness. A diaphragm of thin translucent reddened paper in place of the ordinary metallic diaphragm in the camera has been tried with great success.

IMPROVED FEED REGULATOR FOR BOILERS.

The construction of this machine is based on the principle of gravity acting upon a counterpoised hollow sphere, A, the varying weight of which, together with that of its contents and the counterpoise, is made to operate a lever. The sphere may contain water, water and steam, or steam alone. Fig. 1 shows an illustration of three regulators attached to a similar number of boilers. The flexible pipes, B and C, are made at least six feet long on the horizontal part, and connect the interior of the globes, A, to the interior of the boiler by their connections with the columns, F. The end of the pipe, B, is connected with the proper water level in the boiler, and the pipe, C, called the discharge pipe, is connected at any convenient point below the water level. If the air in the globe, A, is expelled through the air cock, G, and there is sufficient water in the boiler to cover the inlet of the pipe, B, on the water line (steam having been generated in the boilers), water will be forced through the pipes, B and C, and the globe, A will be kept filled. Its weight then overbalances the counterpoise, D, and, by the connecting rod, closes the valve, E, in the boiler feed pipe. The globe, A, is suspended on knife edge bearings, similar to a scale beam; and as soon as the water in the boiler has evaporated so that steam can enter the inlet of the pipe, B, an equilibrium is at once formed, and the water in the globe, A, flows back by gravity, to a level with that in the boiler, through the discharge pipe, C. The weight, D, now overbalances the empty or partially empty globe, A, and falls again, opening the valve in the feed pipe.

The inventor states that this device is now attached to hundreds of boilers, so regulating the feed that a variation of not more than one quarter of an inch occurs in the water level.

Fig. 1



Illustrated in Fig. 1 is a plunger pump, shown with the supply and discharge pipes connected together, to admit of constant motion. Should the valves all be closed in the feed pipe, the relief valve, H, opens and the water circulates back from the discharge to the supply pipe until some one of the feed valves opens. This is one manner of attaching this device when more than one boiler is used. The construction of this regulator admits of its being used only as a regulator. In our last issue a very simple method was shown by which one apparatus performs the double duty of regulating and giving an alarm if by any means the water supply to the boilers is stopped. The danger attendant on connecting glass gages and gage cocks by small pipes, leading out from the tube sheets through the cast iron fronts of tubular boilers, owing to the intense heat acting on these small pipes, is obviated by the use of the column, F. Unless the usual gages are slowly and carefully opened, engineers are often deceived, as steam is shown when there is plenty of water, while there exists the possibility also of their being closed by deposits. The column, F, is attached to the boiler by a one and a quarter inch steam and one inch water pipe, to the front of which a glass gage may be attached with advantage. The inventor states that the use of the column prevents the fluctuations witnessed in the glass gage, as well as supplying clear water to the gage from below the surface, which generally is loaded with more or less scum. Should any enter, however, it may be readily blown out at the bottom of the column.

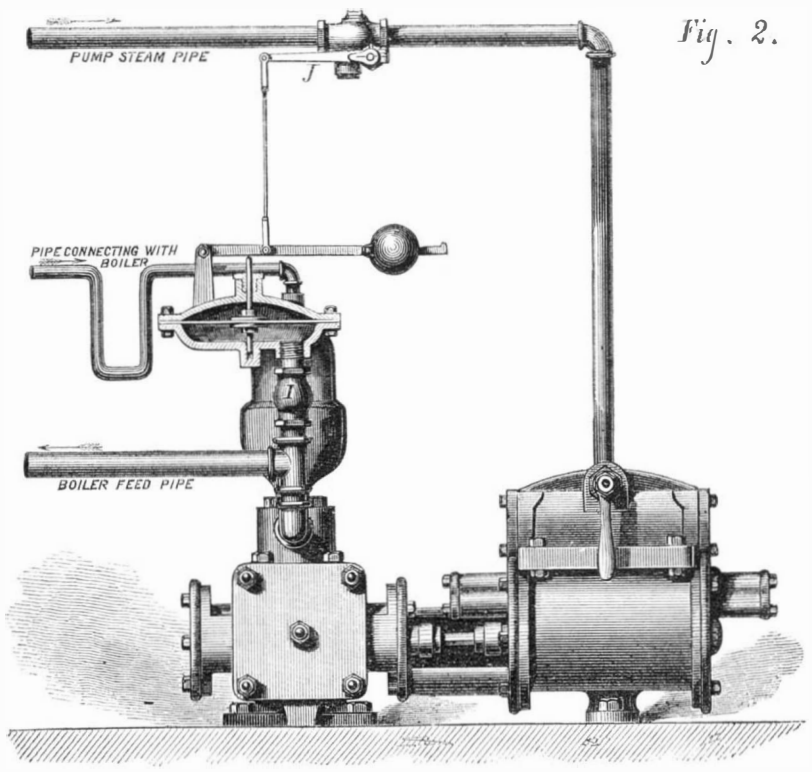
The inventor also states that this manner of attaching a column with pipes of different areas is important, and preferable in all kinds of steam boilers. The column and regulators may be attached to any part of the boiler most convenient for getting a direct motion to the valve, which is operated by the regulator. The latter, in most cases, is conveniently suspended by a flange and a piece of steam pipe from a ceiling or wall, as shown in the engraving. This invention was patented in January, 1871.

Fig. 2 shows another device by which the loss of power, usually consumed in pumping against a weighted valve, as shown in Fig. 1, is avoided. The connections of this machine are simple and economical of power, and it is intended to reduce the wear of pumps used on marine engines, for which it is more especially designed. The construction of it is such that the power derived from the pump may be used either to open or close a valve, as required.

The device is constructed by bolting together two metal disks, with a flexible diaphragm between them. In the center of the diaphragm is a spindle securely fastened, one end of which acts as a guide, the other end extending out through a stuffing box and supporting the lever upon which the weight hangs, the arrangement being somewhat similar to that of a safety valve. The under side of the flexible disk has com

BERRYMAN'S PATENT FEED REGULATOR FOR BOILERS.

Fig. 2.



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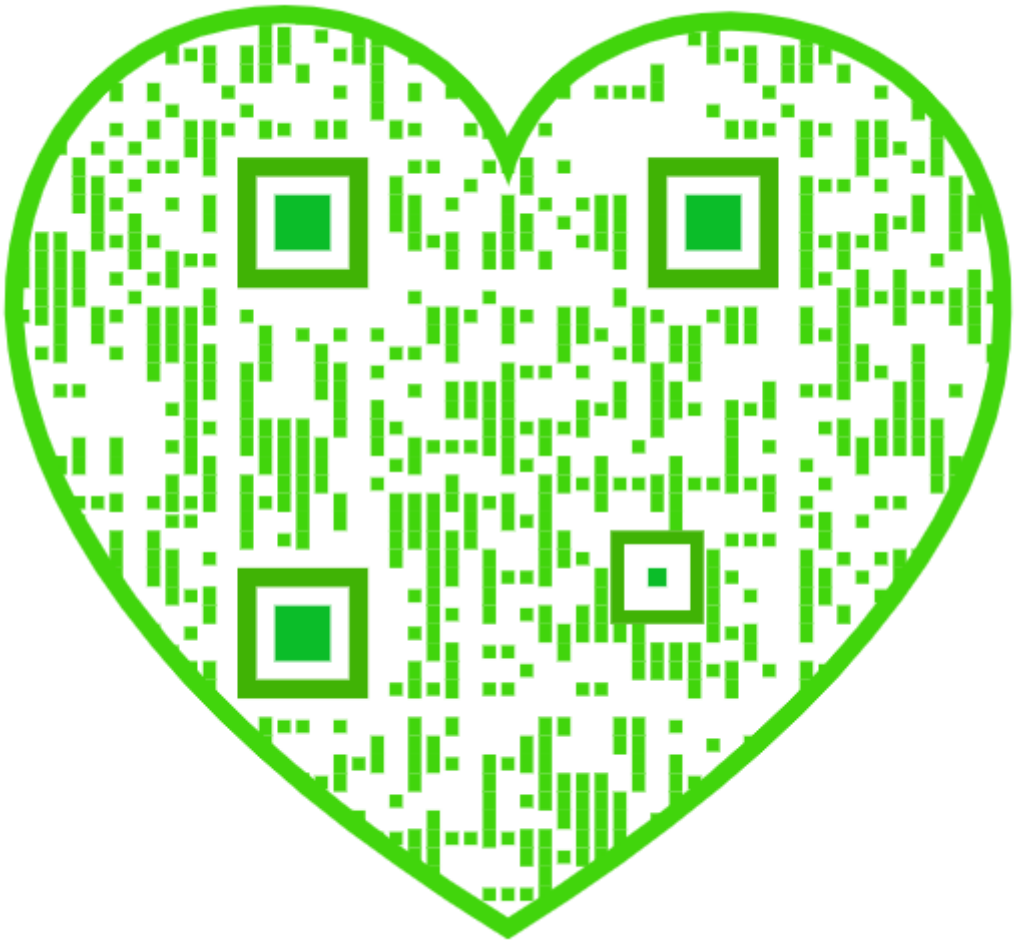
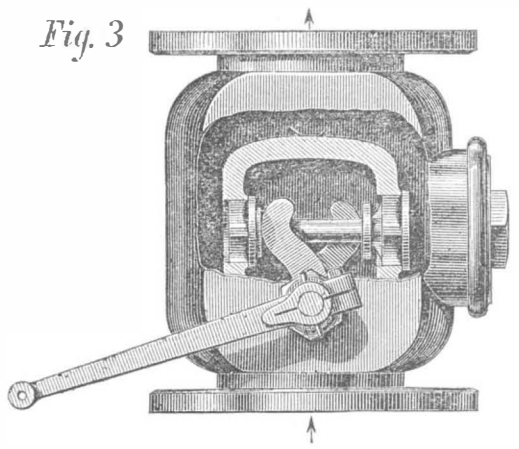


munication with the discharge pipe of the pump, through a connecting pipe, in which is placed a check valve, I, opening in towards the disk. In the spindle of this check valve, a small hole is drilled for the purpose of getting a gradual motion when opening the valve in the steam pipe of a pump, to which it is attached as shown, and is used in feeding a number of boilers regulated by either of the patent regulators. The top side of the disk is connected by a pipe, in which is formed a siphon, leading either from the steam or water space of any one of the boilers, to obtain the same pressure on both sides of the disk. The pressure in the discharge pipe of the pump against the under side of the diaphragm being greater than that in the boilers, the weight and lever are raised.

The operation is as follows: Should all the regulator or feed valves and the feed pipes of the boilers become closed, an increased pressure will at once be thrown on the under side of the flexible disk, and the valve J. in the steam pipe of the pump will be closed, and will remain so as long as the valve remains closed in the feed pipe of the boiler, or as long as the pressure is maintained in the discharge pipe of the pump.

Fig. 3



But as soon as a feed valve is opened, the pressure being reduced, the weighted lever drops to its position again as fast as the water can pass out through the spindle of the check valve, thereby causing a steady movement of the machine. The valves on the feed pipes can all have a slight lead or opening, and thus allow the pump to move constantly at a slow speed. When a plunger pump is used, as in Fig. 1, the valve is placed in the supply pipe, and the pump is allowed to run constantly.

Fig. 3 represents Berryman's balanced valve, patented April 9, 1872. In working his regulator, the inventor found much difficulty in getting a proper valve. In the one now shown in Fig. 3, is found what is essential for his purpose.

The balanced poppet valve in this device has added to it a simple improvement by which the valve is made to rotate on its seat at each time of its opening, causing a constant and equal wear on all parts of the valve and seat. The fork inside has one prong slightly longer than the other, so that at opening, the bearing is on one side of the valve, which tends to rotate it each time it opens. The fork works between two collars or shoulders which allow the valve to move freely; and the inventor states that its construction is such that, having one hundred pounds pressure on the face of one and back of the other valve, it can be opened or closed with a power of less than five pounds on a three inch valve.

For further information concerning all these improvements, address J. B. Davis & Co., sole agents for the Berryman Manufacturing Company, Hartford, Conn.

"GREENBACKS" AND POSTAGE STAMPS.

NUMBER I.

The visitor to Peter Cooper's noble charity, the Cooper Union, in this city, will find that while he is permitted to ramble, unobstructed, around the greater part of the immense building, his entrance to the fourth and to portions of the third stories will be barred by heavy iron gates backed by massive doors, and that his requests for admission to this mysterious quarter will be refused unless he be armed with certain necessary passports. His curiosity, doubtless thus aroused, will be augmented by learning that within those walls, thus secluded from the outer world, comparatively valueless sheets of white paper are changed into millions of dollars, as well as into the stamps which carry his written thoughts throughout the world. In short, the rooms are the workshops of the National Bank Note Company, the corporation that supplies the majority of the money and the postage stamps used, not only in the United States, but in many of the States of Europe, in all of the South American countries, and even in China and Japan.

If the reader will follow us through the processes below described, we will endeavor now to explain how this modern alchemy, which transmutes not baser metals but paper into the equivalent of gold, is carried on. We shall trace the manufacture of postage stamps and greenbacks, in the beginning together, as the various steps are essentially the same, noting, however, afterwards the special points of difference.

The general portion of the work, that is, all the decoration not directly bearing upon the special use for which the note, stamp, bond, bill, warrant, or whatever it may be, is intended, such as border, corner ornamentation, etc., is ready at hand. It has already been drawn and engraved in a manner which will be described further on, and impressions have been taken on paper, so that it is only necessary to cut the latter neatly out and paste them upon a sheet of the required form in their proper places. Then the lettering, vignettes, etc., are carefully drawn, and finally the entire design, which is really nothing more than a patchwork, is finished and submitted. If approved by the Government or party ordering, it is returned with special written instructions as to the details of manufacture. It is then placed in the hands of the workmen, and at this stage we begin our tracing of the process through which it passes to completion.

The first proceeding is making the die. A plate of soft, highly polished steel is selected, and upon it is sketched the design, or, perhaps, such portions of the latter as are of the same color, if more than one tint is to be used in printing. Of course a separate die is needed for every shade used. This is then carefully engraved; the labor is most elaborate and the skill of the operatives wonderful. Steel plate engraving is so generally understood that we need enter into no special description of how it is done; but we simply note the fact that it is the reverse of wood engraving, that is to say, the lines which take the ink are cut into the plate instead of being raised above its surface. The engraver is limited to such parts of the work as can be done by hand; other portions, such as the scrolls and elaborate tracery, are necessarily done entirely by machinery. The principal apparatus used is a complicated piece of mechanism, which we have not space to describe in detail, but which, in brief, actuates a plate to which the steel for the die is attached and caused to press against a diamond point. Perfectly true and delicate lines are thus cut into the metal, making figures technically termed "cycloid rosettes." The machine, in theory, somewhat resembles a kaleidoscope, as it requires to be set by accurate pointers and dials to some special figure, which, when the combination is changed, can never be reproduced. One of these instruments is in use, and its work, together with that of the geometrical lathes, can be readily recognized on the national currency.

The die being now complete, it is ready for the transfer process. Postage stamps, for instance, are made in sheets of two hundred, so that the die must be transferred that number of times on a single plate. It is first case hardened and then put, face up, in a press which is made with a combination of levers actuated by the foot, so as to give the tremendous pressure of twenty-one tuns on a single line. A cylinder or "roll" of soft steel is, by careful gaging, placed so as to rest directly over the face of the die, and, at the same time, is so arranged as to revolve easily along its surface even when under the full weight. The pressure is then applied, with the result of forcing the soft steel of the roll into the lines of the engraving, so that when complete, the periphery of the cylinder shows an exact reproduction of the face of the die, only the lines sunk on the latter are now raised on the former. Next, this cylinder is case hardened. Then the plate —soft steel again—to be used for the final printing is placed in the above mentioned press and the roll arranged above it. Now, the cylinder leaves its impression on the plate, the hard steel of the raised lines cutting deep into the surface, so that a precise duplicate of the original die is obtained. This is repeated for as many times as there are to be repetitions of the stamp or note on the single plate, which is then ready for use. Here we leave it and turn our attention to another part of the manufacture.

The ink for printing is also made on the spot. In a large room are ten or a dozen paint mills, which are busily grinding the colors and oil together. Two large ones are filled with green ink, suggestive of liquid greenbacks, another, with vermilion, while others are making blue, red, and other tinted inks. Nothing but the finest color and the best boiled linseed oil is here used. We now pass to the paper room, where the paper is received directly from the Government, cut in sheets of the required form. The fractional currency and larger notes are made of a peculiar material containing colored fibers, manufactured at Glen Mills, near Philadelphia. The paper for postage stamps is made by the Bank Note Company, of the best linen. It is of short fiber, very fine, and extremely strong. The sheets on which currency is to be printed are counted as soon as received, and the result telegraphed to Washington for verification. Some idea of the accuracy required may be gathered from the fact that, for every sheet unaccounted for, the company has to pay in cash the full value of what *might* have been printed on it; that is to say, if a sheet intended for four $1,000 notes is missing, $4,000 must be returned. The paper varies in size according to the purpose for which it is designed. Thus the sheet for 10 cent fractional currency is 7½ by 16¾ inches, and so on up for the larger denominations. All the paper is not received perfectly blank, for the reason that the National Company prints but one side of each bill. The material for the 15 cent and 25 cent notes is supplied with the backs already finished—the work being done by the American Bank Note Company; while, *vice versâ*, the 10 cent bills are sent to the last mentioned corporation from the National Company in a similar condition. The sheets being counted are placed in heaps, marked off in sets of 100 and 1,000. When issued for printing, the workman receiving them has to present an order signed by the superintendent. They are then charged against him in his pass book, when he carries them away to be damped, this being done by simply wrapping them in wet cloths.

Leaving the paper room, we enter a large apartment, in the center of which are 116 presses arranged closely together. These are simply cylinders moved by long handled levers, and are each attended by three men and a girl. Here we find our plate again, now resting upon a small iron box warmed underneath by gas flames. A workman rapidly covers it with ink with a plate printer's roller and passes it to another operative at his side, who wipes the plate over with a soft cotton cloth, and then polishes with the palm of his hand covered with whiting, thus removing the ink from its surface but not from the engraved lines, which remain filled. This done, the plate is placed, face up, in the press. The girl stands ready with a sheet of damped paper which she carefully lays upon the plate. The pressman turns the levers, the cylinder revolves, the plate passes under it, and the paper is removed bearing a perfect impression. It might be naturally imagined that the workmen engaged in this portion of the manufacture would often succumb to the temptation of furtively running a sheet of ordinary paper through the press, and thus possessing themselves of, say, 200 ninety cent stamps in a moment's time. But such a proceeding is practically impossible. Apart from the constant vigilance of the superintendents, the presses are placed so close together that the men can overlook each other's every action. One of the strongest safeguards is the *esprit de corps* among the workmen themselves. So sensitive are they that they recently insisted upon the discharge of one of their number who, merely to try his press, ran a sheet of common brown paper through it.

As soon as a printer has completed the work assigned to him, he hands it, made up in "books" of 100 impressions, each sheet inclosed between two others of brown paper, to a clerk. He is then credited with his delivery, spoiled sheets being counted the same as perfect ones, so that if his return is correct his debit account on his passbook, which is kept in a totally different apartment and by other employees, is thus balanced. The finished impressions are now carefully counted and inspected. The spoiled ones are removed and sent to Government agents to be burnt, while the others are hung in the drying room. This apartment is heated by steam pipes, and the paper is suspended by wires, for a day or two, until perfectly dry. Then the brown paper is removed and the sheets, packed between leaves of press board, are subjected to the action of a powerful hydraulic press. They are then once more inspected and counted.

SCIENTIFIC AND PRACTICAL INFORMATION.

An esteemed correspondent, Mr. R. B. Forbes, of Boston, Mass., informs us that Mr. Herman Hirsch, whose screw propeller is used on the vessels of the Transatlantic Steamship Company, plying between New York and Havre (France), and has also been adopted by the British Admiralty, has recently discovered the form of least resistance in vessels. Almost every ship that has been built hitherto has been an attempt to solve the problem, and it has seemed that only by trying every possible form could it be ascertained which is the best. Mr. Hirsch is confident that he has succeeded by a scientific process in determining the theoretically perfect lines for a ship, and he will soon lay his plans before shipbuilders and owners. The scientific world will look with interest for the development of the system, especially as it comes from an inventor already successful and renowned.

HOW TO PRESERVE VINEGAR.

Our correspondent "Expert" writes as follows: "This article being the product of three well known chemical fermentative processes, known as the vinous or spirituous, acetous, and putrefactive: into each of which dilute saccharine or starchy solutions pass with great rapidity, under favorable circumstances, it is not exactly correct to attribute the latter process to the "mother" which is formed on good vinegar exposed to the air.

Vinegar makers should never keep their product in open vats or tanks. It ought to be passed from one generator to another till it is strong enough for a fluid ounce to saturate from 33 to 35 grains of crystalized bicarbonate of potassa, when it ought immediately to be run into casks or barrels, in the warm vinegar house kept at a temperature of 85° to 90°; and after filling the casks up to the bung, it should be sealed up tight and covered with a tin cap.

To prevent vinegar from running into the putrefactive fermentation, it is commercial usage to add one ounce of sulphuric acid to 100 gallons. This should not be added until the article possesses the required acetous strength, and is intended to destroy any putrefactive spores which may be present. British standard vinegar is said to have one part of dilute sulphuric acid in every 1,000 parts of vinegar, and this proportion is not regarded as an adulteration or injury in any way.

In general, the presence of mother in the vinegar is not considered objectionable. On the contrary, in domestic use its formation is promoted by using sheets of brown paper, etc. It is the "vinegar plant," about which so much was said, a few years ago, in the papers. Depending, for its existence, on the presence of oxygen, nothing is easier than to prevent its formation by carefully excluding the air.

The presence of mucilaginous matter so affects the specific gravity of the article that no test, by any scale, will prove or show its strength. The only proper method is occasionally to saturate a portion with potassa, using litmus paper to ascertain the degree of saturation."

A FISH SAVINGS' BANK.

There is, in Siberia, a district where the chief wealth and means of subsistence of the people consist of dried salmon; and to obviate the evils arising from an occasional dearth of food, the Russian government has established a savings' bank, with a capital of 300,000 fish. In this institution, every male inhabitant is compelled to deposit one tenth of all the fish he catches so long as the takes are up to the average; but if the yield fails, the contributors are entitled to withdraw their deposits.

ALL three of the Atlantic telegraph cables are now in perfect working order. We hope that the icebergs will not trouble them this winter.

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Explosions in Flour Mills.

Most of our readers, no doubt, will remember the destruction by fire of a large flour mill near Glasgow on the 9th of July last. The fire was caused by an explosion which originated in the exhaust and, traveling through the various conduits of the mill like fire damp in a mine, set fire to the woodwork. The occurrence caused some sensation at the time, not because explosions of the kind were previously unknown—for the high rates of insurance help to show that this was not the case—but because in this instance the attention of the comparatively uninformed public was attracted by the unusual gravity of the accident. A searching investigation into the circumstances which probably led to the explosion at the Tradeston Flour Mills has been made on behalf of the fire insurance offices by Professor Macquorn Rankine and Dr. Stevenson Macadam. We understand that, after having examined witnesses and documents relating to the history of fires and explosions of a like nature, they have reported that the primary cause of the explosion was the accidental stoppage of the feed of one of the pair of stones, which led to their becoming heated and striking fire. The fire thus generated inflamed the finely divided dust which was diffused through the air in the exhaust conduits and then passed on to the exhaust box. This sudden ignition or flashing of the extremely inflammable dust diffused through the air would produce a very high temperature in the gaseous products of the combustion, and this would necessarily be accompanied by a great and sudden increase in pressure and bulk, constituting in fact an explosion. The first effect of this explosion would be to burst the exhaust box and allow the diffusion of dust and flame throughout the mill. A second explosion was the consequence, and the mill was reduced to ruins and the woodwork fired. They further believe that the stores or granaries were set on fire partly by the flame and fire from the mill traveling along the gangways, and partly from the fall of burning materials through the skylights. No explosive or other foreign material was used in the manufacture of the flour, and the steam boilers were found uninjured. No blame has been traced to the proprietors of the mill, or to anyone in their employment.

Direct experiments were instituted by Professor Rankine and Dr. Macadam with the view to ascertaining the inflammability and explosiveness of this mixture of air and dust. They have also calculated that, when the theoretical proportions best suited to produce an explosion are exactly realized, the pressure of the resulting gaseous products, if confined in a limited space, suddenly becomes equal to about eight times that of the atmosphere. It is probable that, in this instance, these theoretical conditions may not have been exactly reached, but still it is certain that a very great destructive pressure was produced. Now the question naturally arises, what precautions should be taken to guard against such accidents in future, or at all events to mitigate their destructive effects. The problem does not seem a very difficult one. The danger does not lie in the grinding process proper, but in the plans for storing up the dangerous flour dust. So long as the grinding operations are carried on in the simple manner pursued in small mills, where the stones are merely boarded in and where there is no exhaust, there can only be a limited amount of dust to inflame. But it is otherwise when the exhaust is employed and the fine dust is drawn up into an exhaust box. There the flame drawn up from the stones must inevitably lead to a more serious explosion, and where many pairs of stones are connected with the same exhaust the danger is enormously increased. It is accordingly recommended that all receptacles in which the dust is collected shall be lightly constructed and placed outside the buildings, in order that any explosion which might occur in them should free itself at once and not be induced to travel back into the mill. The word "receptacle" is understood to include exhaust boxes, stive rooms, smut rooms, and exhaust fans. The report also contains a suggestion that the well known principle of extinguishing a flame by causing it to pass a large cooling surface might be adopted, that in fact the dust should be made to pass through a number of metal tubes instead of through the exhaust trunk. It is, however, pointed out that cold surfaces are also apt to cause a condensation upon them of moisture in the air, and consequently the tube system would perhaps be open to the disadvantage of being liable to become clogged by pasty depositions. Naked lights should not be used in a dusty atmosphere, and all gas jets should be protected with gauze. Finally, as the emission of highly heated particles from the stones is rendered more probable by the entry of nails and pieces of iron with the grain, it is strongly advised that the use of magnets to collect these metallic intruders should be made universal.

It appears that these accidents are of very frequent occurrence, and their number has increased since the introduction of the exhaust. The fact, however, appears to be little known to the general public, and though mentioned in French and German treatises on flour mills, does not, as far as we can ascertain, appear in the standard English works on the subject.—*Engineer*.

Work on the New York City Docks.

We recently gave a full page illustration of the proposed new piers and bulkheads in the city of New York. The present state of the work is that the preparation of the foundations for the new stone piers along the North and East Rivers is being rapidly pushed forward, and at Pier No. 1, on the North River, the stone is already being laid. When it was first determined to replace the old wooden piles with pillars of "enduring granite," it was also deemed advisable to ascertain the depth at which a permanent rock foundation existed, and, under the supervision of General McClellan, a drilling machine, similar to that used in oil boring, was set to work among the upper piers of the North River, the mode of operation being the driving of a six inch iron tube through the strata at the river bottom until a permanent foundation was reached. The boring was begun at the foot of Fifty-seventh street, and continued along the bulkhead line about every 300 yards to Whitehall and along the East River, the distance between the borings being here decreased to 200 yards. The progress of the work has developed many interesting facts concerning the strata of the river bed, which, in most cases, has been found to consist of gravel and petrified wood nearest the surface, then gray sand, coarse gravel, bright red clay, and great quantities of minute sea shells, boulders of two feet in thickness being often met with above the desired mica slate rock, which is found at depths varying from 60 to 200 feet below high water. At the foot of Thirteenth street, the mica was not reached until the tube had sunk 206 feet. In many instances, quicksands have been reached beneath what had been originally supposed to be safe foundation. While penetrating the strata at the foot of Canal street, the old beach level was struck at a depth of 56 feet, and the tube passed through the trunk of a tree which, from the specimen obtained, seemed to be in a good state of preservation, the bark being yet perfect. At Third street, a stream of clear, fresh water was struck, the fluid bubbling up through the tube at the rate of 50 gallons per minute; and another boring in the vicinity revealed another spring, equally fresh and sending out 30 gallons to the minute. The depth of the foundations of mica rock being determined, iron shod piles are driven down and their tops sawn off near the surface, so as to form a resting place for the granite blocks. The pillars—three to each pier—will be unusually massive in construction and lozenge-shaped so as to offer no resistance to the tide. A frame work of iron will be rested on these supports, the whole being covered with a flooring of wood, similar to that in use on the old piers.

Decisions by the Commissioner of Patents.

APPEAL FROM THE BOARD OF EXAMINERS IN CHIEF—DIES FOR FORMING WRENCH HEADS.

L. Chapman vs. Candee and Taylor. Interference.

LEGGETT, *Commissioner:*

Priority of invention may be established by showing either that an applicant was the first to conceive the idea of an invention and the mode of putting it into practice, and used reasonable diligence in adapting and perfecting it, or that he was the first to actually perfect and reduce the invention to practice.

Where an applicant has actually completed an invention, but has not tested its utility for want of machinery to operate it, while procuring such machinery he is to be considered as exercising due diligence in adapting and perfecting his invention.

If the date of filing an application be relied upon as proof of date of invention, it must also be relied upon as proving the invention belonging to the applicant, and this may be disproved by testimony introduced in rebuttal.

Application of Geo. H. Sellers for Patent for Rolled Hollow Hexagonal Column.

In determining the patentability of an article the process by which it is made is immaterial; the article is to be considered independently of the process and upon its own merits as to novelty.

An "article of manufacture" is a device complete in itself for some special use, and not to be applied to general purposes, like pipes or tubes.

LEGGETT, *Commissioner:*

This appeal is upon the application as rejected by the Board.

The claim is as follows:

As a new article of manufacture, a hollow column of uniform thickness, hexagonal on both its interior and exterior, and rolled out from a solid or welded pile or billet of iron or steel with a hexagonal opening through it, substantially as described and represented.

It appears, from the wording of this claim and from applicant's argument, that he understands that the fact that his tube is rolled out materially aids to confer upon it patentable novelty. In this he is entirely in error. The process by which an article is constructed is a matter altogether distinct from the article itself, so far as the question of the patentability of the article is concerned. The process may be patentable and the article not, and *vice versâ*, or both may be patentable. But each must be regarded independent of the other, and upon its own merits as to its novelty. The fact that applicant's "column" is produced by rolling may then be left out of consideration altogether. The question is: Is applicant's hexagonal "column," or tube, new, without regard to his process of making it? I regard it as fairly anticipated by the English patents cited, Nos. 9 of 1854, and 102 of 1862. The former is circular within, but that is an immaterial matter. The form of the space within the interior of a hollow tube can be and is commonly made in all machine shops where such articles are produced, of any shape desired, whether circular, triangular, octagonal, hexagonal, or square, and a pipe of one form of interior might as well be claimed as another because made by a particular process. Besides, a pipe, tube, or "column," of whatever form or by whatever process constructed, is not an article of manufacture in contemplation of the patent law. An article of manufacture is a device complete in itself, for some special use, and not to be applied to general purposes like pipes or tubes. This point has been heretofore fully discussed. (See Commissioner's Decisions, 1869, p. 74, C. H. Ackerson; and 1870, p. 59, W. R. Blanchard; and p. 123, L. E. Truesdell.) Nor does the fact that applicant employs the word "column" in his claim aid him at all. He does not produce and has not shown a column in any other sense than that a tube or pipe may be regarded as a column. The Examiner's strictures upon the application of this term to this mere hexagonal tube were entirely proper. A column, in a technical sense as known to mechanics, is a very different thing, and he was quite right in refusing to be blinded to the nature of the device before him because it was—whether for the purpose of misleading him, or not—called by a wrong name.

Again—granting that the exact form of applicant's tube is not shown by the references—the mere change of form of a tube, or the mere production of a tube of a particular shape externally and internally, does not constitute invention. In a broad sense, such as is contemplated by the legal requisites of novelty to distinguish a patentable device, there is no advantage in this particular form of tube to give it the importance of invention. It is not stronger, or better, or cheaper of production than a round tube except merely in form; and in whatever particular situations tubes hexagonal in form may be desired, mechanics readily make them. Applicant's invention is not in his "column," but, if anywhere, in his process, or machine, or perhaps in both. To grant him a patent covering hexagonal tubes would be a violation of the letter and spirit of the law.

The decision of the Board of Examiners-in-Chief is affirmed.

Application of Henry Waterman for extension of Patent No. 21,286, and reissued No. 1,874, for Tempering Wire.

LEGGETT, *Commissioner:*

The claim is as follows:

The process, substantially, such as herein described, of hardening steel wire, or other thin steel, of any desired length, which process consists in drawing the wire continually, while under tension, through the heating medium, and thence through the hardening liquid.

The process previously employed was to wind the wire in a flat coil, in the form of a volute, tie it with small wire, and, after heating to the proper degree, to plunge it into the hardening liquid. This process limited the length of the wire to be hardened, did not always harden it equally, and sometimes caused it to "crinkle." Applicant's process cured all these defects, and at the same time greatly reduced the expense of hardening, according to the evidence, to at least one fourth the former cost. Besides, it produced a wire capable of many uses to which wire, as before prepared, was not adapted, thus presenting every element of a meritorious invention. Through applicant's efforts, which are shown to have been reasonably diligent, it soon went into extensive if not exclusive use, and has earned him, at a moderate charge for royalty, the net sum of $65,916.76. The Examiner reports the invention to have been novel when patented, and the testimony, of witnesses familiar with it and the business connected with it, with regard to its value and importance to the public amply shows, by estimates from reasonable data, that probably not less than a million dollars have actually been saved and gained for the public by it. Although no testimony has been filed in opposition to the grant of the extension, counsel appeared at the hearing and cited the English patent of Wm. Smith, No. 1,614 of 1855, in bar. I do not regard this patent as in any measure covering applicant's invention. It is for a materially different process of treating wire, for an altogether different purpose, namely, to soften and not to harden it, so that it may be afterward drawn. But whether it covers the invention under consideration or not is immaterial, because applicant establishes his date of invention as prior to the date of the English patent. This patent was sealed January 15, 1856, and it is proved that applicant completed his invention in 1855.

The only question as to the propriety of granting this extension is as to whether the applicant has not already been adequately remunerated. $65,000 is a large reward, but there is no definite standard of adequacy. Considering the important character of the invention, the advance it made in the art to which it appertains, the diligence of the inventor in introducing it, and its great saving to the public, I am constrained to grant the extension.

Decisions of the Courts.—United States Circuit Court, District of Massachusetts.

BROWN *vs.* WHITTEMORE *et al.*

This was a suit in equity, brought by Alzirus Brown, a territorial assignee, against Jonathan R. Whittemore, John R. Whittemore, Benjamin Belcher, and John W. Belcher, in the district of Massachusetts, for an alleged infringement of letters patent for an improvement in hay rakes, granted to George Whitcomb October 5, 1858, and reissued in two divisions June 16, 1868.

The case came on for final hearing before Justices Clifford and Lowell.

Verdict for complainant.

What is a Bustle?

"The bustle referred to is substantially a hoop-skirt of a diminished size." This is the definition of Judge Blatchford, as given in the recent trial, Young *vs.* Lippman, United States Circuit Court, Southern District of New York.

This was a suit in equity, brought by Alexander R. Young against Philip Lippman and Clara Seligman for the alleged infringement of letters patent for an improvement in springs for hoop-skirts, granted to Thomas B. De Forest and Thomas S. Gilbert, February 18, 1868, the infringement complained of consisting in the manufacture and sale of the article of wearing apparel known as a bustle.

The case came up before Judge Blatchford on a motion for a provisional injunction.

The claim is in these words: A skirt-hoop, formed by inclosing one or more wires within a covering, which not only envelopes and protects the wire, but forms an edge, A, or connection, B, substantially as and for the purposes specified.

The allegation of infringement in the bill is that the defendants are making and selling springs for hoop-skirts precisely the same as those described in the plaintiff's patent. The evidence of infringement is that the defendants have sold an article of dress called a bustle, containing hoop-skirt wire made substantially in the manner described in the patent, and that the defendant Lippman has been vending such hoop-skirt wire.

The making and selling of the bustle are not denied, and a specimen is produced which contains wire hoops made in the manner described in the patent. Each hoop in it is a skirt-hoop formed by inclosing two wires within a covering which not only envelopes and protects the wires but forms a connection between them, substantially as and for the purposes set forth in the specification of the plaintiff's patent.

There can be no doubt that the claim of the patent is for such a skirt-hoop as is described, as an article of manufacture, a skirt-hoop capable of use in making what is known as a hoop skirt. The bustle referred to is substantially a hoop-skirt of a diminished size.

Injunction granted.

E. N. Dickerson, for complainant. J. B. Staples, for defendant.

COAL is now being imported into England from Belgium. It can be shipped from Ghent and delivered at Grimsby for nearly one dollar a tun less than the current prices in England. This is due to the recent advance in the price of English coals, which, it is believed, cannot be much longer maintained.

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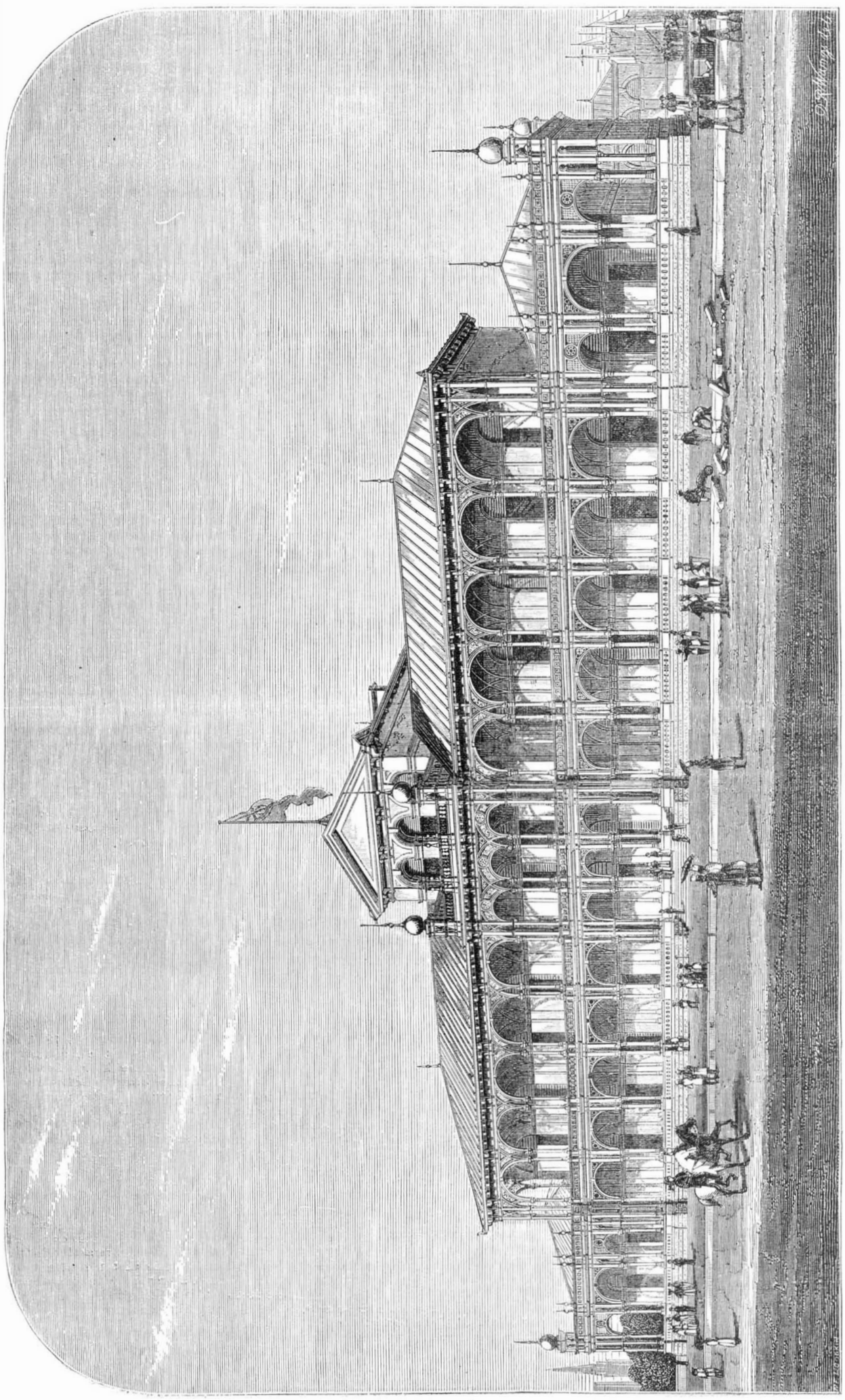
SAILORS' HOME, BOMBAY, INDIA.

On the occasion of a visit of the Duke of Edinburgh to Bombay, it was determined to commemorate the event by the erection of some permanent work of public utility; and the happy idea was suggested that nothing would so appropriately celebrate the visit of the Sailor Prince as the foundation of a new Sailor's Home, plans of which had already been prepared, the existing building having been found entirely inadequate to meet the constantly increasing requirements of the port. The foundation stone was accordingly laid by his Royal Highness, in the presence of Sir Seymour Fitzgerald, the Governor of Bombay, and a large concourse of natives and foreigners of distinction.

Eager to satisfy their appreciation of so auspicious an event as the visit of a royal prince of England, some of the native princes subscribed largely to the funds; the Guicowar of Baroda alone contributed the munificent sum of twenty thousand pounds.

We give a general view of the proposed new Sailors' Home, as designed for the site originally given by Government, which possesses a frontage towards the sea of 300 feet, with a western aspect. The central block and south wing comprise complete accommodation for 126 seamen: the north wing is devoted entirely to officers' quarters; and the master's residence is placed in the attic story, in the center of the building. The kitchen department is placed in the northeast; and the lavatories and earth closets for seamen in the southeast angle of the site, communicating respectively with the main building by means of covered corridors. Wide verandahs encircle the whole edifice to the west and south, and smaller ones at the back. These it is proposed to construct entirely of iron, which would be made in England and sent to Bombay, ready to fix. The floors throughout are to be constructed with rolled iron joists and cement concrete. The windows are, in all cases, to have double casements, the one glazed and the other Venetian. The roofs are designed to be constructed throughout of iron, covered with Italian zinc, laid on solid boarding; and special precautions have been taken to secure thorough ventilation, and to provide against discomfort (particularly in the dormitories, which occupy the whole of the upper story) from the great heat of the climate. It should be stated that the plans have been so arranged that, by the addition of either one or two stories to the north and south wings, the amount of accommodation might easily be doubled.

Mr. J. Macvicar Anderson, of London, England, is the architect.



SAILORS' HOME, BOMBAY, INDIA.

Mechanical Pigeons.

Pigeon shooting from the traps has of late years become one of the standard sports with lovers of the trigger, and the announcement that a shoot is to take place is sure to call together a crowd. While many attend to witness the trials of speed, many others equally enthusiastic over fine shooting remain away on the ground of cruelty, deeming such shoots a wanton destruction of poor harmless birds. Many devices have from time to time been originated looking to the furnishing of something to take the place of live birds. While some have failed entirely and others being unreliable in their workings, our sportsmen have generally given all the go by and had recourse to the live birds. Though Yankee ingenuity is equal to almost anything, it has been the lot of England to produce a device which in its workings seems to be the desideratum desired, a specimen of which we were shown on Saturday by a gentleman of this city, who recently sent to England and obtained it. The invention consists of a neat brass locomotive whistle-shaped trap, fixed by a ground fork to the earth, which, by spring action, gives flight to a steel-winged bird, the motion of which through the air is wonderfully natural and bird-like. The "Gyro" bird flies distances ranging from thirty to one hundred yards. The "Gyro," in its flight, exhibits innumerable vagaries, going off with the steady flight of a pigeon, resting on the wing like a hawk, or darting swiftly forward in a straight line like a snipe, thus affording the very best practice for the education of the hand and eye of the shooter. It can be despatched by means of a ball and socket joint to the trap, in any desired direction, and it is asserted it is far more difficult to hit the "Gyro" than a live bird.—*Syracuse* [*N. Y.*] *Journal.*

The mechanical description above given is rather mixed. The *Journal* will have to try it again.

Telegraphic Items.

The new Society of Telegraph Engineers, in England, have commenced the publication of a journal, in which the progress of telegraphy as a science and as an art will be duly recorded. The first number contains a paper on "Automatic Telegraphs," by Mr. R. S. Culley, who thinks that, without the automatic apparatus, it would be impossible to supply the information required by newspapers all over the kingdom. "From the central station in London as many as 400,000 words are transmitted in a single night, and through five or six stations simultaneously, whereby it happens that the quantity of matter telegraphed is equal to a thousand columns of the London *Times*. All this is accomplished while one half of the world are asleep. The rate of transmission varies: To Aberdeen, it is 60 words a minute; to Sunderland, 90; while to Manchester, Liverpool, and Cardiff, it is 120. The messages are punched in strips or ribbons of paper, and these can be multiplied to any extent when pressure of newspaper work requires. The punching of the strips is greatly facilitated by the use of a pneumatic apparatus, in which the levers are struck by pistons actuated by compressed air. Three keys, like those of a pianoforte, open the valves, and the touch is so light that three or four ribbons can be perforated at the rate of forty words a minute, by a female clerk."

It would appear from the foregoing that our English telegraphers have not yet acquired the art of sending telegraph messages in the quickest and most economical manner, and they have something yet to learn. The aggregate number of words transmitted at the central office of the Western Union Telegraph Company, in this city, exceeds that of the London central station, but no "punched strip" or automatic machines are employed in the New York office. Experience shows that the interposition of the punched strip, the punching machine, and the girl to do the punching, are an unnecessary complication in the sending of a telegraph message. First class operators can send messages more economically and quickly by the usual instruments than is possible by the above "automatic" plan. The rates of speed mentioned above, we believe, are equaled, if not exceeded, at the Western Union Telegraph office here.

In the working of the telegraph, some curious facts have been observed. A message sent through land lines and an under-sea cable travels quicker to the place which has the long land line than to the shorter. From Amsterdam to London, a signal is transmitted at greater speed than in the reverse direction; the reason being, that on the English side there is a wire of 130 miles, then a cable of 120, and on the Dutch side a wire of 20 miles. This difference, however, can be rectified by a scientific contrivance.

Another fact arrived at by observation is that, on wires stretched east and west, the speed is decreased every day about noon. The cause, we are informed, is not clearly understood; but it is supposed to be due to the diurnal variation in earth currents.

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WIRE ROPE TOWAGE ON THE DANUBE.

We have, in other numbers of the SCIENTIFIC AMERICAN, described the Belgian plan of towing canal boats by a wire rope submerged in the canal, and have also described the same plan as now used on a portion of the Erie canal in this State. The fact that the system is now being extended on the Erie canal will lend additional interest to the following description of the performances of a new boat now used on the Danube, for which, with the engraving, we are indebted to *Engineering*.

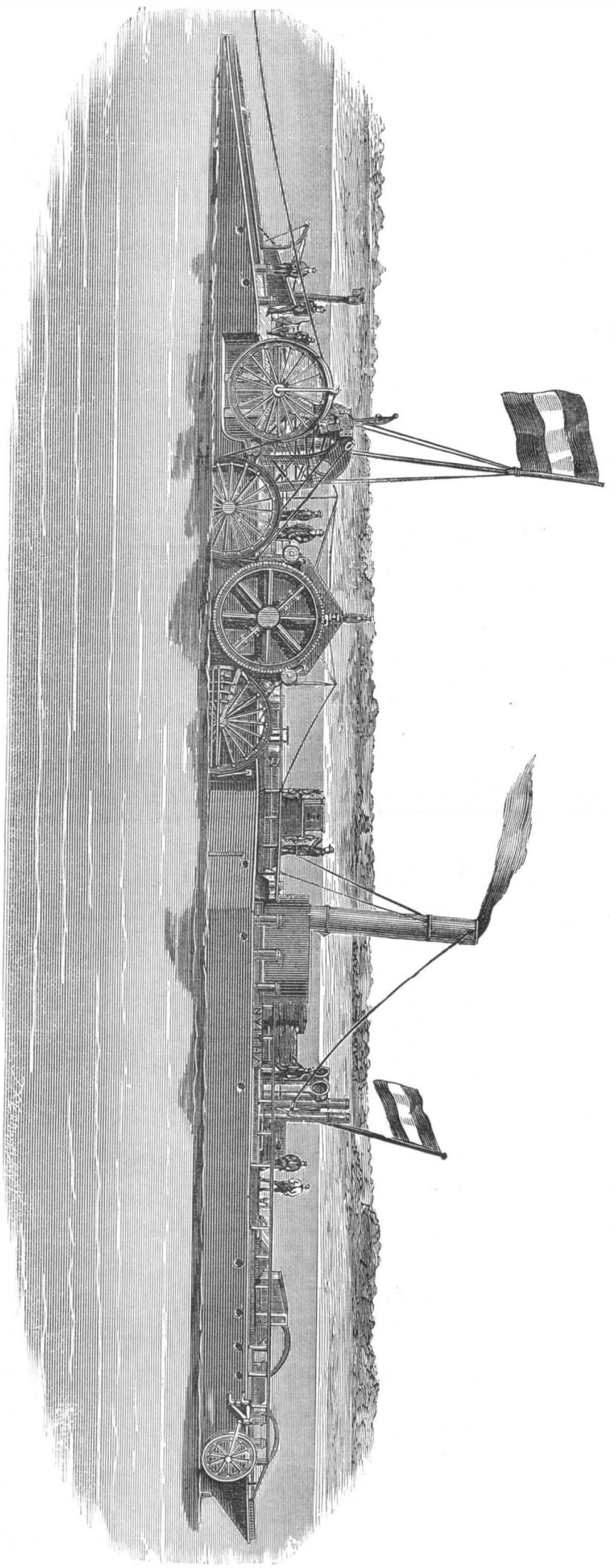
The Nyitha, shown in our engraving, is a flat bottomed iron vessel of 138 feet length, beam, 24½ feet, and depth of hold, 7½ feet. It is provided with two false keels, and has a large rudder at the bow as well as at the stern, each rudder being separately governed by a wheel placed near the center of the boat.

As on most rivers with rapid currents, it is intended to use the wire rope on the Danube only for towing up stream. The tug is therefore provided with twin screws of 4 feet 2 inches diameter, worked by two separate vertical engines, placed near the bow and supplied with steam by the same boilers, which also work the clip-drum machinery.

The diameter of the clip drum is 10 feet 6 inches. One revolution of the engine corresponds to an advance of the boat by slow speed gear of 4·1 feet, by quick speed gear of 7·5 feet.

The clip drum is keyed to the outside end of the main shaft; it therefore overhangs the larboard side of the boat, its horizontal center line being about 1 foot above deck. The clips are set to work a 1⅛ inch wire rope. Two press pulleys can be made to touch the rope, somewhat above the horizontal center line, of which the hind one at least is required to give to the last clips of the drum the necessary initial bite, whenever the back rope gets unusually slack.

For the purpose of leading the rope from the bottom of the river over the clip drum, and permitting it to sink down again into the water, there are three large guide pulleys employed, each having the same diameter as the clip drum itself, namely, 10 feet 6 inches. The first pulley over which the rope passes runs loose on a stud fixed to a wrought iron bracket, which is provided with two nearly vertical steel pivots. These pivots are held in corresponding bearings, firmly connected with the ship's side. Thus the pulley is able to swing about, very much like a door swinging on its hinges, and will place itself readily in the direction indicated by the wire rope. It will be understood now why the deck near the bow of the ship slopes down towards the water, thus permitting the wire rope to pass over it at any angle without hindrance. To allow for the swinging of the pulley towards the ship, a segment had to be cut out of the ship's side, but this segment is entirely above the water line, and therefore of little importance.



WIRE ROPE TOWAGE ON THE DANUBE.

The second pulley, which the rope touches along the underside of its periphery, turns on a stud fixed in the side of the vessel. It is so placed that the center line of the pivots of the swinging pulley above described is tangential to both pulleys, so that the rope runs perfectly correct from one pulley to the other, whatever the position of the movable one may be.

From this pulley the rope runs over the clip drum, touching the upper half of its periphery, after which it passes over to the third and last guide sheave. This again is a swinging pulley, with perfectly vertical pivots, its bottom edge reaching below the keels of the vessel. Thus the back rope is allowed to fall to the ground at any angle it may assume towards the center line of the ship. Here also a segment had to be taken out of the regular side of the vessel, to permit the pulley to swing inwards if required.

Throughout its passage through the pulleys, the rope is everywhere carefully guarded against getting out of the grooves when slack. These guards had to be so arranged that they can readily be removed and replaced whenever the rope has to be taken off or put on again.

The total displacement of the boat, when ready for service, amounts to about 200 tuns; the draft is 3 feet 9 inches, the immersed midsection 74 square feet. Besides the machinery weighing 42 tuns, boilers weighing 32 tuns, and coal bunkers holding 10 tuns, it contains nothing but the usual accommodations for captain, engineers, and crew, and the necessary fittings and contrivances for attaching barges, etc.

A variety of experiments have been made with this vessel, and among them a train of eight loaded barges was towed with the following results, assuming an engine which burns three pounds of coal per indicated horse power, the steam gages indicating a pressure of from 66 to 75 lbs., and the permissible boiler pressure being 80 lbs.:

Total displacement	2,753	tuns
Useful load in eight barges	2,023	"
Total immersed midsection	784	sq. ft.
Length of course	13·3	miles
Time of running	4 h. 34 m.	
Speed against land	2·91	miles
Speed of current	2·83	"
Speed against current	5·74	"
Indicated horse power	107	
Real horse power, in wire rope	80	
Strain in rope	10,312	lbs.
" per tun displacement	4	"
" " square foot of cross section	13·1	"
Total coal consumed	1,467	"
Coal consumed per mile	110	"
" " " " and tun of displacement	0·037	"
Coal consumed per mile and tun of useful load	0·054	"

The above results would be greatly modified, when the system is applied to canal navigation proper. In this case there would generally be no current against the boats, and the speed of the train would, under any ordinary circumstances, scarcely be permitted to exceed four miles an hour; in fact, three miles an hour would be considerably in excess of the average speed at present practicable on ordinary canals.

For such a speed, a train of three boats would produce a strain in the rope of about

$$\frac{3^2}{7{\cdot}728^2} \times 7485 = 1127 \text{ lbs.}$$

The speed being three miles per hour, or 264 feet per minute, we would require $\frac{1127{\cdot}264}{33000} = 9{\cdot}016$ horse power, corresponding to 12 indicated horse power.

The useful load moved would be 752 tuns, and as the engine in the tug could easily give off, as shown by the trials, 11 times the power thus required, it could move at the given rate 11×752 or 8272 tuns, equivalent to forty-one 200 tun boats. Of course it would, for practical reasons, be out of the question to employ such enormous trains. Smaller engines and tugs would be employed instead. A tug, for instance, with an engine giving off 27 to 30 indicated horse power (equivalent to a nominal 10 horse power engine) would tow 3×752 tuns=2256 tuns of useful load in, say, eleven 200 tun boats at the rate of three miles an hour. The coal consumed for this smaller class of engine may be assumed to be four pounds per indicated horse power per hour. Thus the whole coal consumption of the engine per hour would be 4×27=108 pounds, or per mile, 36 pounds, and per mile and tun moved, $\frac{36}{2256} = 0{\cdot}016$ lb.

This figure will, no doubt, be modified by the proportion of the cross section of the canal and the boats, which, as a rule, is much more favorable on open rivers. On the other side the tug employed will have a comparatively smaller immersed midsection and total displacement, and will, therefore, require less power to move itself than the larger river tug on which the above calculations are based.

AMERICAN genius stands preëminent in the perfection of mechanical appliances to supersede manual work. Perfect invention to this end is, indeed, the offspring of necessity in the United States, where scarcity of hand-labor has forced forward, to an almost inconceivable degree, human ingenuity. In this special branch of invention, there can be no dispute that the Yankee can give the world long odds and beat him. In England, where labor has been always abundant, and until of late, cheap, the genius of invention has trodden rather the higher than the humbler path, has tended rather to achieve great ends than to effect simple purposes, has given mechanical handicraft less attention and devoted itself to great physical revolutions. In America, it is far different; there is scarcely an industry too humble, a labor too mechanical or common to escape the attention of the inventor, who, with an almost infinite ingenuity, sets himself to work to combine all the known mechanical movements and to invent new ones, until the sleight of the hand of the operator is imitated to the life, and the dead metal is endued with life and power with which flesh and blood cannot compete.—*Engineering*.

THE mixing iron scraps, filings, or drilling chips from machine shops, in the soil about the roots of pear trees, is becoming general with some of our best fruit growers. The health and productiveness of the trees are greatly promoted thereby. Pieces of iron hoop, old scythes, and other useless bits of iron have long been used by the most successful growers.

TO convert French currency, stated in francs, into U. S. currency, divide the number of francs by 5. To convert English currency, stated in pounds, multiply the number of pounds by 5. The above methods, although not exact, will be found approximately correct. Thus 10,000,000 of francs equals about $2,000,000, and £2,000,000 equals about $10,000,000.

THE St. Louis *Republican* states that a prominent citizen Mr. George Osgood, died recently at New Salem, Mo., from lead poisoning, occasioned by the use of water drawn through a new lead pipe about two years ago. This poison first showed itself at the tips of the fingers, gradually working into his arms and neck, thence into his heart, resulting in his death.

AN industrial exposition is announced in Brooklyn, N. Y., to open on September 30 and close on October 22. With a population of 500,000, and numerous and important manufactures, Brooklyn ought to support an annual fair of this kind

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Correspondence.

The Editors are not responsible for the opinions expressed by their Correspondents.

Force of Falling Bodies.

To the Editor of the Scientific American:

A close examination of the supposed contradiction between Dr. Vander Weyde and a former correspondent, Mr. Nystrom (pages 164 and 131), on the subject of the force of falling bodies will show that both agree as far as the principle is concerned, and that their only distinction lies in their choice of words.

Mr. John W. Nystrom gives formulæ based on the principle that the force, F, of the weight, W, falling through the distance, h, is: $F = W \times h$, and that this force is used up in driving the nail through the distance, d. His opponent says that the force ought to be measured by the *vis viva*, expressed in the formula $v^2 \times m$. A slight transformation of the first formula will show, however, that there prevails no contradiction whatsoever. If a body falls through the hight, h, its velocity is expressed by $v =$ the square root of $2gh$ or $v^2 = 2gh$ where g means the acceleration by gravitation. Instead of h in the first formula,

$$\frac{v^2}{2g}$$ can be substituted. We have then $$\frac{W \times v^2}{2g},$$

and as the weight of a body divided by the acceleration of gravitation is the mass, m, of the same, the formula has now the appearance: $F = \frac{1}{2} \times v^2 \times m$, which proves conclusively that Mr. Nystrom measured the force by the *vis viva*, $v^2 \times m$, but used different words, such words as can be better understood by the workman.

Dr. Vander Weyde says further: "Where gravitation increases or decreases, and with it the velocity of the falling body, the force of the blow will increase or decrease as the square of the gravitation, while the weight of the body will only increase or decrease in the simple ratio of the gravitation." The velocity will increase or decrease in the same ratio as the gravitation only if the body is allowed to fall for the same length of time; and as, in order to attain this purpose, the hight of the fall has to be changed in the same ratio as the gravitation, not only the weight, W, but also the hight, h, in Mr. Nystrom's formulæ have to be increased or decreased, and the result will prove to increase or decrease as the square of the gravitation. If, though, Dr. Vander Weyde wishes the hight of the fall to be unaltered, he would be entirely wrong in maintaining his assertion that the velocity of a body (by falling through a given hight) increases as the gravitation does. The known formula $v =$ the square root of $2gh$ shows that the velocity in this case increases only with the square root of the gravitation, because the time of the fall will be no more the same. Therefore the *vis viva*, $v^2 \times m$, in this case, increases only in the simple ratio as the gravitation, and Mr. Nystrom's formulæ do not contradict this.

These formulæ, though, are only correct as long as the resistance, against the falling body during the moment of the blow, is constant, and the distance, d, can be measured. In many cases the blow is taken up by the elasticity of the striking bodies, causing the falling body to rebound, or is used up for change of form or by friction and transformed into heat. In most of these cases the resistance, R, is varying very much during the time of the blow, and the distance, d, cannot be measured, often being very small. Therefore the force of the blow, that is, the pressure between the striking bodies cannot be determined by calculation, and is in many cases much greater than might be expected, especially if the striking bodies are hard and elastic, as is the case in striking an anvil with a hammer.

All the instances given by the latter correspondent have no bearing on the formula, for the door through which the pistol ball has been fired, without apparently being moved, had certainly to stand the pressure which crushed the fibers of the wood, but this pressure lasted too short a time to effect a motion of the whole door. HUGO BILGRAM.

Philadelphia, Pa.

Force of Falling Bodies.

We print the following *literatim:*

To the Editor of the Scientific American:

It is not convenient for me to answer Dr. Vander Weyde's squable on force of falling bodies, which bear evidence of gift of the gab, v×m and v²×m, vis-viva, according to circumstances. JOHN W. NYSTROM.

Philadelphia, Pa.

An Aching Inventor.

To the Editor of the Scientific American:

I am aching to relieve myself of two or three ideas which properly belong to the public, and I take this means of so doing. Among the thousand and one ways of propelling canal boats which have been proposed, I have not seen the following very simple plan, namely: To connect the motive power with two paddle wheels without paddles, said wheels adjustable perpendicularly so that they may rest upon the bottom in from seven to twelve feet water. Let the wheels consist of hub and spokes without felloes or tires, and of sufficient weight to take a good hold on the mud. The only side swells would be those caused by the boat itself, as that caused by the wheels would be almost nothing, and what little mud was stirred up would be an advantage, as serving to deepen the channel.

What is the use of employing heavy traction engines on expensive roads at one side of the canal, when there is a good hard bottom, only seven feet below the boat, on which to take hold? The wheels need not take up more than three inches on each side of the boat, and would not interfere with its steering qualities, so that boats could pass without obstructions or delays.

My next improvement is to construct a sewing machine with a double pointed shuttle, the machine running either backwards or forwards, and the feed works operating either way. The advantage would be that the machine could not be run "backwards," either way being right; it would do away with complicated mechanism for reversing the feed, and allow of sewing back and forth without turning the work; and in beginning or finishing a piece of work, two or three stitches could be taken first in the opposite direction, and the motion then reversed, in order to fasten the thread.

Not having the time or means for experimenting on these plans, I turn them over to the readers of the SCIENTIFIC AMERICAN, and merely beg them, when they have realized fortunes on them, to give me a fair share.

And now my last concerns you more particularly. Why can we not have the SCIENTIFIC AMERICAN published on double the number of pages of just half the size?

Appleton's Journal is allowed on all sides to be the most attractive of American publications, and in my mind the great merit is in its convenient and handsome size. By the single paper it makes no difference, but when bound, how neat, convenient, and handy is the *Journal*, and how awkward, ungainly, lop-sided, and un-get-at-able is the larger sized paper! As we all want our numbers bound for preservation and future reference, you can judge what an interest we have in the subject. VOYAGEUR.

[1. The idea of propelling canal boats by spoke wheels, as proposed by our correspondent, is very old. It is objectionable on account of the varying depths of the water.

2. Expensive roads are not required for the use of traction engines.

3. Double pointed shuttles for sewing machines are very old, and in use.

4. The majority of the readers of the SCIENTIFIC AMERICAN regard the present form of its pages as the most suitable and convenient.—EDS.

Fast Small Side Wheel Steamers.

To the Editor of the Scientific American:

Your correspondent, Mr. Lynn, on page 130 in your issue of August 31, invites an opinion as to the probable speed of his side wheel boat, of which he gives the data at 70 feet length, 15 feet beam, draft 16 inches without load, with two engines, 10 inches diameter by 3 feet stroke, 120 pounds of steam "with engines wide open," and wheels 12 feet in diameter. At 20 inches draft, this gives about 18 square feet of immersed cross section, and a displacement of about 25 tuns.

This is an interesting case, as giving an excellent opportunity to illustrate the waste of power in urging a short vessel beyond the speed due its length, as taught by the experiments made by Scott Russell and others. According to these experiments, her length corresponds to a speed of about ten miles per hour, which she could accomplish in the common way at the usual expenditure of power. Disregarding the condition of length, the standard formulæ would make her speed, everything being in proper proportion and order, from 19½ to 20 miles per hour, the wheels making 60 revolutions with 21 per cent slip, the steam being cut off at three quarters stroke. There would be too much strain upon engine and boat, and too much waste of steam, with "engines wide open," developing about 192 indicated horse power. The useful thrust of the engines would be about 2,150 pounds, allowing 60 per cent useful effect of the engine and 20 per cent slip of the wheels. This gives over 119 pounds for each square foot of middle cross section. With such a power and proper length the speed named would not be extraordinary, but, on the contrary, it gives a rather low coefficient. When, however, length is taken into consideration, the usual formulæ give her speed at about 13·4 knots, or 15⅓ miles, per hour.

If Mr. Lynn will favor the public, through your valuable paper, with the result, the question as to how the drawback of want of length may, to a great extent, be overcome, might then be discussed. R. CREUZBAUR.

New York city.

The Meteoric Shower in North Carolina.

To the Editor of the Scientific American:

From your issue of August 31, I learn that the shower of meteors expected on the 10th of that month "did not make its appearance in the locality of New York." In this section (eastern North Carolina) an immense number of meteors were seen between the hours of 10 and 12 at night.

Roxobel, N. C. J. E. T.

[We are glad to receive the report of our correspondent, and if any others of our readers made similar observations, we hope they will report.

Careful observations by a number of different persons were made at Yale College, and they report an increased fall of meteors, during the night, over the number ordinarily to be seen.—EDS.

Heating and Cooling our Dwellings.

To the Editor of the Scientific American:

In your issue of September 14, W. C. D. reproaches present civilization with supineness in not having supplied a means of cooling and ventilating our dwellings, and significantly points out a means of doing so, by forcing external air by hydraulic power through ice packings. The refrigeration he proposes might prove more fatal than if his charge of external air were freighted with contagion. Summer air treated thus would more rapidly chill the body than the direct application of a "cold easterly storm."

The thermometer in the room in which I write stands at 90°; if this room were closed, and such a refrigeration as W. C. D. proposes were applied, carrying the mercury down to 75°, a "dew point" would be reached, in which temperature a man who had been through the heat and toil of the day would sleep at the risk of his health or his life. If the air surrounding the body, under 98° and over 80°, be rapidly or sufficiently displaced, the body will take care of itself. A hydrauli c fan will do this. R. H. A.

Baltimore, Md.

The Metis Disaster.

To the Editor of the Scientific American:

On reading the first accounts of the disaster of the steamer Metis, it occurred to me that there ought to be a law in the United States, requiring every steamer (or at least those which carry passengers) to be divided, below the water line, into compartments, so that one of them being broken into and filled with water would not sink the vessel. If the unfortunate Metis had been constructed in this way, the 70 lives lost on August 30 might all have been saved; and a few hundred dollars spent in repairs would render the Metis seaworthy again. I believe most, if not all, of the large ocean steamers are constructed with bulkheads; why not have all the small passenger boats constructed in the same way, since their safety is of equal importance with that of the large ones?

A friend of mine, Mr. Hanes, made a suggestion that, since a part of the upper deck of the Metis floated, why not make all steamers for carrying passengers with the deck so constructed that it could be readily detached when the lower and heavier part of the vessel sank away from it, and so constructed, also, that, when thus detached, it would float and really become a life boat, keeping the passengers above water until they could land or go aboard some other vessel? This, it seems to me, would not be difficult to do. Either of these means, or any other which promised the greatest safety to travelers, would be readily adopted if those who go into the enterprise were as anxious about the safety of their passengers as they are about making dollars.

In a country like ours, where there is not only a growing civilization but a rapidly increasing population, the increase of travel must be very great; and this being the case, every device which can in any degree add to the public safety ought to be adopted without waiting for an immense sacrifice of life to compel the community to demand these safeguards.

W. WICKERSHAM.

Boston, Mass.

Car Coupling Dangers.

To the Editor of the Scientific American:

I noticed, in the SCIENTIFIC AMERICAN of September 21, a communication with regard to the danger of coupling cars, together with an article on the same subject in which the opinions of those familiar with the matter are invited. Your correspondent blames brakemen for taking unnecessary risks in order to save themselves a little trouble by not getting on the platforms of cars to do the coupling. Evidently he is not well informed on this particular point of the subject on which he writes. As a brakeman myself, I speak knowingly in saying that I myself would (and I have never seen any one but who would do likewise) gladly avail myself of any opportunity to save the risks encountered in coupling; and getting on the platform is a very little trouble to take, I am sure. But, as I shall show, this is not always practicable by any means. On the Erie railroad, as well as on some others, the passenger cars all have self-acting couplers, and the old fashioned drawheads, with links and pins, are only in use on freight and coal cars, where there are no platforms, and consequently the brakeman has necessarily to encounter all the risks that your correspondent enumerates. Some engineers seem to have no regard whatever for the safety of those engaged in coupling, and take no pains at all to move the cars so slowly as to give the person who does the coupling time to couple up and get out from between the cars and to avoid having to run two or three yards with the cars before they slack sufficiently to let him out; and the coupler hereby runs the great risk of stumbling and losing his life, as all is done so quickly that he has no time to pick his steps. I fully agree with your denunciation of wrought iron drawheads with their small mouths. Why such things should be gotten up passes my comprehension; for certainly they are no cheaper than cast iron ones, and I doubt if they are any more durable. On the Erie railroad, however, the wrought iron ones are not nearly so common as the cast iron, which are made with very wide mouths so that a coupling need hardly ever be missed on account of the link striking the edge of the drawhead. This, however, is but a slight advantage, and in no wise lessens the dangers of coupling. Cannot some one invent an apparatus for coupling which will combine cheapness and durability with safety in operation, and which can be applied to both freight and passenger cars? Surely an invention of this kind, which would have the effect of saving so many lives every year, ought to claim more attention than many which have for their only merit the saving of a little labor. No matter if it should be a little more difficult to operate; give us something whereby our limbs and our lives are not continually risked. Such an invention would be looked upon as a genuine blessing by every.

BRAKEMAN

Rochester, N. Y., September, 1872.

NEW EXPLOSIVE MIXTURE.—M. Violette has made the observation that by fusing together a mixture of the nitrate and acetate of soda, a white, hard mass is obtained, which, when heated to 350° C. (662° F.) explodes with violence. By plunging into the liquid mixture a lighted body, an explosion instantly follows.

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[Special Correspondence of the Scientific American.]

LETTER FROM PROFESSOR R. H. THURSTON.---LAST LETTER OF THE SERIES.

General view of Chicago.—The University of Michigan.—A glance at Detroit.—The Niagara suspension bridge.—The great falls of Niagara —Their estimated value for commercial purposes.—General impressions of the journey.—The wonderful engineering and industrial progress of our country.—Its extraordinary natural advantages.

HOBOKEN, N. J., August 25th, 1872.

Chicago, although possessing in the aggregate many manufactories of various kinds, is rather a commercial than a manufacturing city; and our visit to the rolling mill described in the preceding letter was almost the only one made in the Garden City. We learned, incidentally, that the harbor has a depth of 14 feet in places, making it an excellent haven, and it has been very greatly improved by liberal outlays in engineering during some years past. Its harbor, the many radiating lines of railroad which together place the city in communication, by land or water, with every section of the country, its central location and the wonderful activity of its people have made Chicago remarkable for its rapid growth in wealth and population, and have already placed it among the most important of American cities. Since 1840 its population has increased, from less than 5,000, to about 300,000 in 1870.

We left Chicago on the morning express train of the Michigan Central, and, satisfying ourselves that the company had been enterprising and intelligent enough to provide the train with the Westinghouse brake and that other valuable improvement, the Miller platform, we spent the hours, with greater satisfaction than usual, in the enjoyment of the continually changing scenery of the pleasant and productive country through which we rode.

THE UNIVERSITY OF MICHIGAN.

We stopped, at evening, at Ann Arbor, where we had an opportunity to visit the grounds of the great University of Michigan, which, under the able administration of our old friend and teacher, President Angell, and his able corps of professors, is becoming a giant among our universities. The town is very pleasantly situated, the colleges are finely located, and the 1,300 or 1,400 students of the University should be able to find much pleasure as well as excellent instruction here. Professor DeVolson Wood has recently left the chair of Engineering to accept that of Mathematics and Mechanics in the Stevens Institute of Technology. This great loss to the University will, however, be at once repaired, and we may anticipate the uninterrupted prosperity of that noble institution.

A GLANCE AT DETROIT.

En route again, next day, we had an opportunity to glance at Detroit, the "City of the Straits." One of the oldest of our northern frontier towns, it has only within a comparatively short period exhibited the real western rapidity of growth. It has now a population of over eighty thousand, and its splendid situation, upon the beautiful strait uniting the upper lakes with Lake Erie, has given it a large and lucrative trade with other lake ports and has, as well, made it the seat of considerable manufacturing. Crossing the strait we passed over British soil, on the Great Western Railroad, in cars of standard gage drawn by a broad gage locomotive, and, late in the evening, crossed the Niagara river on Roebling's great suspension bridge, one of the noblest works of that great engineer. As the train slowly passed over, nothing was visible, by the faint starlight, but the seemingly slender cords sustaining it above the abyss; but the sound of the rushing of the waters along their deep narrow channel, two hundred and fifty feet below, came up through the gloom with impressive distinctness and, mingling with the still more impressive thunder of the distant falls, produced in the mind the conviction that we were in the unseen presence of Nature's sublimest objects.

THE NIAGARA SUSPENSION BRIDGE.

The Niagara suspension bridge is now about 25 years old and has been even recently pronounced the "grandest and most distinguishing achievement of art" in the world. Although of less span than the Cincinnati bridge, it is a stronger and heavier structure. Its span is 822 feet; its roadway is 245 feet above the water; its towers are 78 and 88 feet high; its cables are 4 in number and of 10 inches diameter. There are 4,000 miles of wire in the cables and stays, and the total weight of the bridge is something over 1,600,000 pounds. It has a factor of safety of about 6. Its cost was $500,000.

THE CATARACT OF NIAGARA.

This bridge is two miles below the falls. Another suspension bridge of much greater span, but calculated only for a single roadway carriage bridge, has recently been erected a very short distance below the falls and from this a splendid view of the cataract is obtained. Standing here, the day after our arrival, seemingly suspended over the tremendous gorge by a few slender threads, Mrs. Sigourney's lines came into the mind with a new and previously unrecognized meaning:

> "Flow on forever, in thy glorious robe
> Of terror and of beauty; God hath set
> His rainbow on thy forehead, and the cloud
> Mantles around thy feet, and He doth give
> Thy voice of thunder power to speak of Him
> Eternally; bidding the lip of man
> Keep silence, and upon thy rocky altar
> Pour incense of awe-struck praise.

All of the water flowing into Lake Ontario from the upper lakes, the drainage of a half million square miles of territory, here precipitates itself into a gulf one hundred and sixty feet in depth. Nearly 20,000,000 of cubic feet of water pass over the precipice per minute, and the amount of energy developed in its fall is almost two thousand times as great as the power expended in the propulsion of one of the great steamers of our transatlantic lines. Were all of this inconceivably great power usefully applied, its annual value to the country would be something like five hundred millions of dollars, and would pay the national debt in five years. A hundred thousand years this wonderful water power has been uninterruptedly in existence. Human skill and intelligence have now succeeded in making an insignificant commencement in the work of substituting utility for natural sublimity; it would be a wonderful yet unpleasing triumph of mind over matter were some future day to see that work completed. Who shall, however, pronounce it impossible?

There are many subjects of interest that I should like to touch upon in this last letter of a rather lengthy series, but neither time nor the space available in the crowded columns of the SCIENTIFIC AMERICAN allows of their consideration.

GREAT ENGINEERING AND INDUSTRIAL PROGRESS.

Our hurried journey and hasty observations of the more striking phase of western and northwestern engineering has, however, filled a note book with information too purely technical for publication here, as well as with much that would interest others than professional engineers. Engineering, in the districts visited, is frequently very rough; but it is yet effective, and no intelligent engineer will wholly condemn it. It cannot be doubted that, had it been attempted to erect none but the most substantial structures and to build none but highly finished machinery, a serious check would have been placed upon the development of the country; and, with the demand for capital far in excess of the supply, an immense amount of important work would have remained undone. Now, capital is flowing westward with greater freedom, and we find, as a natural consequence of the fact and of the rapid creation of wealth in the more completely settled States, that noble bridges, good roads, well equipped rail roads and systematically worked mines are becoming the rule rather than the exception. We were everywhere surprised, in travelling on the more recently constructed railroads, to find such heavy traffic, both freight and passenger, as ought in most cases to make them paying property already. It is one of the most convincing of all proofs of the marvelously rapid yet healthy growth of the States of the Mississippi Valley. We were pleased to see, here and there, evidence that the cultivation of forest trees had received some attention. The rapid denudation of the forest covered lands of the less settled portions of the country makes the cultivation of trees in the fully settled States a matter of vital importance to the nation. Well considered legislation upon the subject has been already too long deferred.

OUR WONDERFUL MINERAL RESOURCES.

Another thought which comes to mind after a mental retrospect of this pleasant tour, and prompted also, in some degree, by a glance at the neat land office map of our mineral lands which hangs upon the wall, is that our country is wonderfully blessed with an abundance of all the essentials of prosperity in manufactures and of rapid advance in civilization. In every direction we find immense and readily worked deposits of coal, iron, copper, lead and other useful minerals; while, in some otherwise unattractive territory, are distributed veins of ores of the noble metals which attract population and induce the early settlement of the less readily accessible portions of the country.

With such splendid opportunities for progress in manufactures as no nation ever yet possessed, and with, at the same time, such an extent of fertile soil as can nowhere else be found accompanying mineral wealth, it requires only intelligent and conscientious legislation and habits of industry and frugality in our people to build up such a civilization as the world never yet saw, and one of which no living man can yet probably form more than a faint conception.

R. H. T.

Black Wood Varnish.

It cannot be denied that the fine, black, shining color of ebony pleases the eye; hence on this account, as well as from the love of imitation, it has long been attempted to imitate this foreign wood. The result is, after numerous experiments, that not only this color, but its individual properties, can be so closely imitated that ebony is no longer in such great demand, on account of its high price.

According to J. C. Ackermann's trade circular, there are two kinds of black varnish: 1. The ordinary black varnish for different kinds of wood; 2. The black ebony varnish for certain native woods which approach nearest to ebony in hardness and weight. The ordinary black wood varnish is obtained by boiling together blue Brazil wood, powdered gall apples and alum, in rain or river water, until it becomes black. This liquid is then filtered through a fine organzine, and the objects painted with a new brush before the decoction has cooled, and this is repeated until the wood appears of a fine black color, It is then coated with the following varnish: a mixture of iron filings, vitriol and vinegar is heated (without boiling) and left a few days to settle.

If the wood is black enough, yet for the sake of durability, it must be coated with a solution of alum and nitric acid, mixed with a little verdigris; then a decoction of gall apples and logwood dyes are used to give it a deep black. A decoction may be made of brown Brazil wood with alum in rain water, without gall apples; the wood is left standing in it for some days in a moderately warm place, and to it merely iron filings in strong vinegar are added, and both are boiled with the wood over a gentle fire. For this purpose soft pear wood is chosen, which is preferable to all others for black varnishing.

THE FINE BLACK EBONY VARNISH.

Apple, pear and hazlewood are recommended in preference for this; especially when these kinds of wood have no projecting veins, they may be successfully coated with black varnish, and are then most complete imitations of the natural ebony. For this varnish: 14 ozs. of gall apples, 3½ ozs. of rasped logwood, 1¾ ozs. of vitriol, and 1¾ ozs. of distilled verdigris are boiled together with water in a well glazed pot, the decoction filtered while it is warm, and the wood coated with repeated hot layers of it.

For a second coating a mixture of 3½ ozs. of pure iron filings, dissolved in ¾ of a litre of strong wine vinegar, is warmed, and when cool the wood already blackened is coated two or three times with it, allowing each coat to dry between.

For articles which are to be thoroughly saturated, a mixture of 1¾ ozs. of sal ammoniac with a sufficient quantity of steel filings is to be placed in a suitable vessel, strong vinegar poured upon it, and left for fourteen days in a gently heated oven.

A strong lye is now put into a good pot, to which is added coarsely bruised gall apples and blue Brazil shavings, and exposed for the same time as the former to the gentle heat of an oven, which will then yield a good varnish.

The pear wood articles are now laid in the first named varnish, boiled for a few hours, and left in for three days longer; they are then placed in the second varnish and treated as in the first. If the articles are not then thoroughly saturated, they may be once more placed in the first bath and then in the second.—*Oberlausitzer Gewerbeblatt.*

The White Grub.

There is a certain spot on our lawn which is infested with this pest, to its great injury. The grubs have completely severed the grass roots, so that the turf loses its color and may be rolled up like a sheep skin, disclosing quarts of the larvæ. The robins have found out the peculiarities of this spot, and I have often amused myself by watching their operations and observing the manner in which they feed, morning and evening, on the shiny fat worms. Frequently two or three dozen birds at a time may be seen stalking over the spot, occasionally turning their heads to one side as if listening intently, then suddenly plunging their beaks into the turf and tearing away like mad until they drag forth the grubs, which they then eagerly devour. The robin does not, however, appear to be well adapted to this kind of work. The turf being rather tough, he does not always succeed, pull as stoutly as he may. If he fails, he deliberately turns aside and tries another spot. The crow, with his strong, sharp pointed dibble, is much better fitted to be successful in this business of grub catching. When we see him sauntering about in the pastures or meadows in his leisurely way, we must be sure not to disturb him, for he is doing the farmer good service. It is pleasant to know that the robin does some good. He is such a gluttonous fruit eater that, were it not for this propensity to catch insects, we should regard his presence as an unmitigated misfortune, despite the sentimental fondness for 'robin redbreast" inculcated in our childhood.—*H. T., in the Oneida Circular.*

The Recent Strike in London.

The combined strike and lock-out, which has thrown the metropolitan building trades into confusion for the last twelve weeks, has terminated unsatisfactorily; so says the *Building News.* Influenced by the general rise of prices and the increased demand for labor in the country, the London carpenters, joiners, and masons demanded more wages and shorter hours; and, as a matter of course, these demands were stoutly, and not in the politest way, resisted by the masters. Hence the strike and lock-out which, at one time, threatened to be one of the most robustly contested struggles on record. The men demanded ninepence an hour, and nine hours' work per day. At first all the building trades joined in the demand, and at one time there were between 10,000 and 12,000 men on strike in London. The masons, however, were the first to give way. They made, on their own account, without consultation or understanding with the amalgamated trades, arrangements with their employers on a modified basis of action. From that moment the strike phalanx was broken, and the prospects of a successful issue on the part of the men narrowed.

Transferring Pencil Drawings on Paper to Other Paper.

Any kind of reasonably fine paper, either thick or thin, serves to receive the copy. Simply lay it upon the drawing board, then upon the face of the drawing paper lay the transfer paper, and upon the top of the lot lay the drawing, pencil marks upwards, fasten the whole three sheets together and to the board by four drawing pins, one at each corner, then proceed to run over the pencil marks with a fine but dull pointed instrument. Use for the purpose a stocking darning needle with a handle and the point ground off; run over the marks in the same way as with a transparent slate. If the drawing is not too thick and the carbon paper is good, a good copy may be obtained, with care and practice. Copies are also taken by first perforating the picture with small holes along the marked lines with a needle, then afterwards laying it on the face of another sheet of paper, and rubbing it over with powdered black lead; the black lead goes through the holes and leaves a dotted outline beneath. A pencil is afterwards run over the marks, and a fair copy is produced, which can be quickly multiplied.

COLORATION OF WOOD FOR VENEERING.—To make the color penetrate the wood thoroughly, it is necessary to soak the woods for 24 hours in a solution of caustic soda, and finally boil them for half an hour; on being washed and dipped in the color bath for 24 hours, they take the color all through.

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IMPROVED COTTON PRESS.

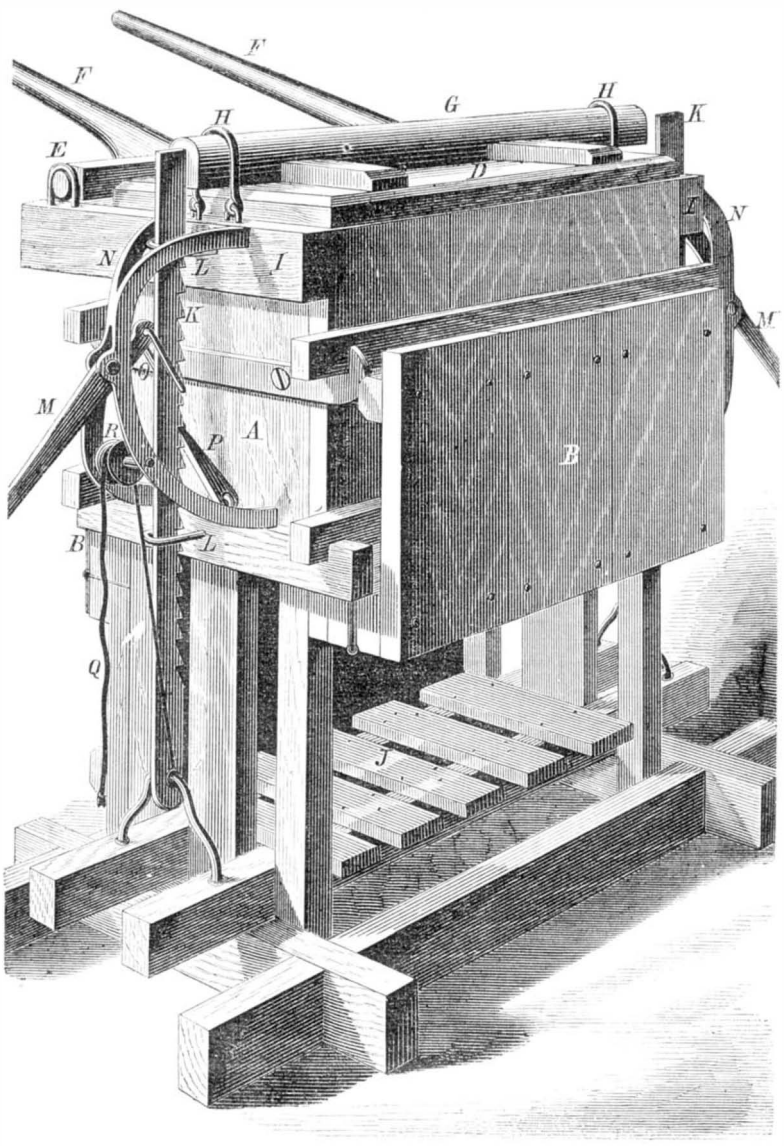
In this cotton press, the follower is moved from bottom upwards, forcing the cotton into the upper part of the machine, by the action of hand power applied through the ingenious combination of mechanical devices below described.

The engraving shows a perspective view of the apparatus with the follower at its lowest position. A is the press case. Hinged thereto on either side, and opening from the top downward, are two doors, B, one of which is represented as open and raised, and the other as shut. A cover, D, closes the top of the press case. This opens upward on the pivots, E, and is moved by the hand levers, F F. When shut it is firmly fastened by the bar, G, the extremities of which are held in the metal links, H, attached to the beams, I. J is the follower, constructed as shown, attached to which, on either side of the press, are the notched bars, K, which are confined in suitable guides, L L. The cotton being placed in position, the lower doors, B, and the cover, D, closed, the bars and, at the same time, the follower, are raised by means of the levers, M. These are pivoted to supports, N, and to their short arms are attached links, O, which, passing over the bars, engage in their notches, thus lifting them, when the outer ends of the levers are forced down. P shows one of the holding pawls, which retain the bars when the links go back to engage a lower notch after lifting the bars to the hight of their range. Also attached to each end of the follower are ropes, Q, which, passing over pulley, R, on the supports, N, serve to lower the follower readily when the press is to be filled, the links, O, and the pawls, P, being lifted out of the notches.

There is an absence of complication of parts about this press which renders it both economical in first cost and easy of repair. Its effectiveness in pressing, which depends upon the increased power gained by its mechanical arrangement, may be readily determined by simple calculation based upon the length of the lever arms and the amount of force to be applied thereto, friction being considered. The arrangement of ropes and pulleys for lowering the follower is a novel improvement, and the general mode of raising the latter by the notched bar and lever is claimed to be specially advantageous.

The top cover, on which the greatest strain is brought to bear, is fastened in the firmest manner by the transfer bar and links, so that if the machine be properly constructed of strong material there is no possibility of its giving way. It may be noted, as an interesting point regarding this device, that it is the invention of Gus. Falkner, formerly a slave, but now a free citizen in North Carolina—although, we may add, it is by no means the first patent granted to a colored man.

Patented through the Scientific American Patent Agency, April 30, 1872. For further particulars regarding rights, licenses, etc., address Col. W. J. Green, Box 610, Baltimore, Md.



FALKNER'S COTTON PRESS.

IMPROVED HOSE COUPLING.

The invention illustrated herewith is designed to provide a means of readily and securely coupling hose without having recourse to the ordinary and disadvantageous method of screwing the two parts together. Fig. 1 is a perspective

Fig. 1.

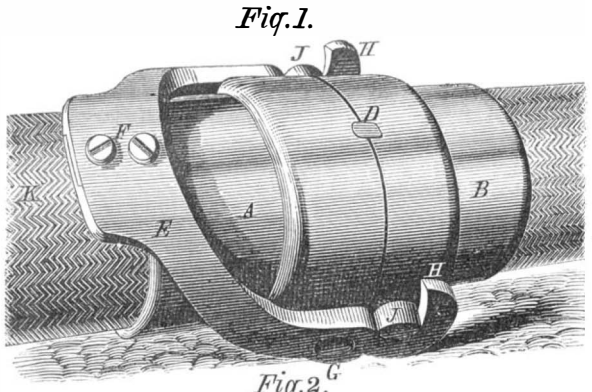
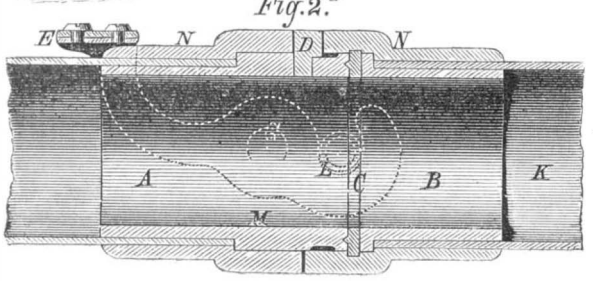


Fig. 2.



view of the coupling fastened, and Fig. 2 shows a vertical section of the same. It will be seen that the device is constructed in two portions—that on the left, A, being the male, and that on the right, B, the female part. In order to render the joint perfectly water-tight, a packing ring of india rubber, C, Fig. 2, is confined in a groove on the female part, while, entering a recess on the same portion, a guide, D, on the male part, retains the coupling in proper relative position.

The mode of fastening is at once simple and effective. E is a steel or iron double cam hook lever made in the form of a stirrup, in two pieces, which are halved together as shown and joined by screws at the point, F. Its fulcrum pins are represented at G, on the male part of the coupling, while the cam hooks, H, in which the short ends of the lever terminate, engage the fastening pins, J, on the female portion.

Friction rings on these fastening pins, shown by the dotted lines at L, Fig. 2, render the separate parts easily joined. The hose, K, is confined by means of the interior rings, M, and the shoulders, N, in the ordinary manner.

The mode of operating this device is to bring the two parts together, bearing down the male portion with one hand and moving the lever so as to cause it to hook on the fastening pins with the other. In view of the simplicity of this invention, it is hardly necessary to recapitulate advantages which are clearly apparent. The rapidity with which the joining of the sections can be effected at times when every moment is of value, and the non-liability of its working parts to get out of order, render the device especially adapted for the purpose for which it is designed, and well worthy of the examination of members of fire departments or others having frequent occasion to use extended lengths of hose.

Patented through the Scientific American Patent Agency, August 13, 1872. Further information may be obtained by addressing Mr. J. W. Magill, Little Falls, N. Y.

Polishing and Painting Floors.

Dissolve three ounces of potash and four drams of catechu in four pounds of boiling water, in an earthen pot. When these ingredients are dissolved, add two pounds of water and boil again, stirring in four ounces and a half of yellow wax with a wooden rod. Continue boiling until all the lumps of wax disappear. Let cool, and add three pounds more of water. In this condition, it is ready for use. By boiling the wax and potash together, a soluble wax soap is formed, so that a floor waxed with this preparation may be swept, but cannot be washed with water, for that would dissolve off the soluble wax soap. For this reason an oil paint is preferable to wax polish, the only advantage being that it dries quickly while other paints require a long time, during which the room cannot be used.

For painting floors, says the *Building News*, the mineral paints are exclusively used. Paints which contain white lead are too soft, and wear off very easily. If a floor painted with oil colors wears off unreasonably fast, it is sure proof that the paint contained white lead. This generally happens because such colors cover better and are more easily applied. Even the use of varnish boiled with litharge is to be avoided, and one boiled with borate of manganese preferred. As a rule, it should have two coats, but the greatest care should be taken that the first be perfectly dry before the second is put on. After the floor has been painted, in order to give it a polish and make the surface more permanent it is coated with what is called "floor lac" which may be made thus: Dissolve one ounce of shellac in a quarter pound of 80 per cent spirits, and add to the solution one dram of camphor, and strain out the lees in a linen cloth. This lac is used after the paint is dry, and gives more tenacity to the surface. A fresh coat of lac may be applied from time to time as it wears off, and you have always a fine polished surface which can be washed.

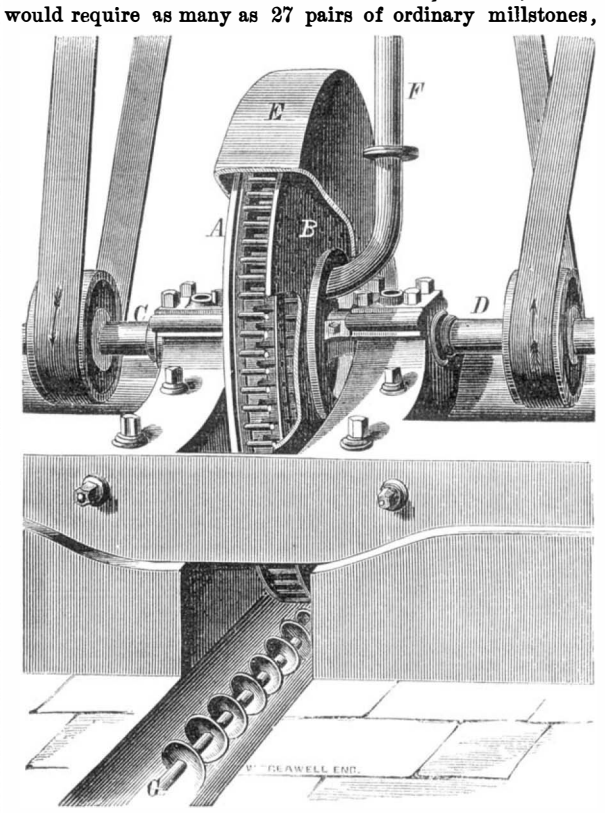
THE DISINTEGRATING OR CENTRIFUGAL FLOUR MILL.

Mr. Thomas Carr, of Bristol, England, is the inventor of the disintegrating mill, heretofore referred to in the SCIENTIFIC AMERICAN, which is stated to have been applied in practice with success for various purposes. Percussive instead of grinding force is employed, and the most novel use of the apparatus is the manufacture of flour from wheat. We are indebted to Leffel's *Mechanical News* for the main points of the following description. Our engraving gives a general view of a seven-foot disintegrating flour mill, various portions being represented as broken away in order to show the interior arrangement of the working parts. A and B are circular metal disks, which rotate in contrary directions upon the shafts, C and D, which are situated in the same line. On the inner surfaces of these disks are concentric rings of projections, called beaters, the rings on one disk intervening alternately with those on the opposite disk and moving in a contrary direction. Several concentric rings of beaters may be thus made to operate conjointly.

The revolving beaters are inclosed in a casing, E. The grain is delivered down the fixed shoot F, through the orifice in the outer casing, into the innermost cage, from which it is instantly projected by centrifugal action through the machine and delivered, in a shower radiating from every portion of the circumference, into the outer casing, in the form of a meal similar to that thrown out by the ordinary millstones; to this state the grain is reduced almost instantaneously by being dashed to the right and left alternately by the bars of each of the successive cages revolving in opposite directions at a very high rate of speed. As it falls to the bottom of the casing, the meal is continually removed by the ordinary rotating screw, G, used in flour mills; it is then passed through the usual bolting machines to separate the bran, and subsequently through silk dressing machines to separate the fine flour from the semolina. The latter is then winnowed by an exhaust current of air in a machine for that purpose, so as to free it from all finely powdered bran, and is afterwards ground between millstones, of which three or four pairs are kept for the purpose; the flour resulting from it is added to the fine flour produced at the outset by the disintegrating flour mill, and to insure perfect intermixture, the two are then passed through the silk dressing machines together.

The machine is driven at a speed of about 400 revolutions per minute; and the outermost ring being 6 feet 10 inches diameter, the last beaters have a velocity of 140 feet per second, or about 100 miles per hour.

Foreign substances which would prove of great injury to millstones are readily thrown out by the centrifugal force in this machine. The work accomplished by a machine of this description, of 6 feet in diameter, is stated to amount to 160 bushels of wheat per hour, which would require as many as 27 pairs of ordinary millstones,



THE DISINTEGRATING FLOUR MILL.

taking the average duty of each at 6 bushels per hour. The Bonnington Mills, of Edinburgh, Scotland, report a difference in favor of the disintegrator of £9, or 5½ per cent in the item of the marketable value of flour. As this grain is equivalent to an extra profit of £16 on each 100 quarters of wheat (a sack being 280, and a quarter 496 lbs.), and the rate of produce being 20 quarters per hour, no inconsiderable gain is effected. The repairs, it is stated, on one of these mills, working 22 hours per day for twelve months, were practically nothing.

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THE LATEST DISCOVERIES IN THE NATURE OF THE SUN.

Frankland has recently made the important discovery that when a flame of hydrogen gas burns in oxygen under high pressure, it becomes very luminous, and gives in the spectroscope a continuous spectrum without lines, the same as is the case with incandescent solid or fluid bodies. This induced Muellner to examine with the spectroscope the electric spark when it passes, not through highly rarefied, but through condensed, gases. He found that the hydrogen spectrum becomes continuous when the gas is highly condensed in the tube, and when it is raised to a very high temperature by means of the spark of a Rhumkorff coil, intensified by the use of a Leyden jar.

If the spark, which this apparatus produces with the Leyden jar, is passed through a tube in which the hydrogen gas is highly rarefied, the three characteristic narrow lines, the red, blue and violet, show themselves well defined; when the rarefication is diminished so as to obtain a density equivalent to the mercurial pressure of one inch, the blue and violet lines become broader, while the space between D and F becomes feebly luminous. The rest of the spectrum remains, however, like a dark background.

By increasing the pressure of the gas, the two lines mentioned expand more and more, so that at last they appear as a luminous ground; at the same time the red line begins, at a pressure of 14 inches of the mercurial column to appear as a broad red band, which is no longer separated by a dark space from the continuous orange color of the background; but the space between is luminous.

At higher pressures, the luminosity of the continuous spectrum increases everywhere, so that, at a pressure of 40 inches, it is all illuminated between the extreme hydrogen lines, like a spectrum of a white hot solid body; but the light is somewhat differently distributed. At 60 inches mercurial pressure, the whole spectrum becomes indeed dazzling, and then the following curious and interesting phenomenon appears: The inside of the glass tube begins to volatilize and shows the line of the sodium vapor as a beautiful double dark line. It is thus seen that, for the production of the dark lines of Frauenhofer, the light of a glowing solid or liquid body is not indispensable.

In consequence of all this, Zoellner comes to the conclusion that the visible solar surface is formed by that layer of its hydrogen atmosphere in which, by increased pressure, the spectrum has become continuous; and that the glowing fluid surface of the solar globe lays below this bright luminous envelope of hydrogen. If we now consider the sun spots as local, slag-like, cooling products, floating on the glowing liquid surface and the *penumbra* as condensation clouds which surround the shores of the slag islands to a certain hight, then the centers of the sun spots must necessarily appear deeper than the visible solar surface, and the phenomenon so minutely observed and described by Wilson is explained in the most natural manner. The depth of the dark solar spots below the luminous surface has been determined, by different observations, to be on an average about 8 seconds of a degree; as this is nearly the 225th part of the apparent solar diameter of 30 minutes, it is also the 225th part of the 800,000 miles of the actual solar diameter, which gives nearly 2,600 miles for the depth, which thus is about equal to the diameter of our moon.

Among the characteristic forms of the protuberances, there are many which compel the observer to the conclusion that enormous and powerful eruptions of glowing hydrogen are taking place. Zoellner has often seen such protuberances project to a hight of 3 minutes of a degree, the tenth part of the solar diameter, 80,000 miles high in the time of 10 minutes. The enormous masses of hydrogen thus suddenly let loose into space, originate, according to this observer, in local accumulations, which form under the liquid surface, and which at last, by their increasing tension, break through the latter in the way that volcanic eruptions break through the solid earth's crust.

On the theory of the conservation of forces, Zoellner has calculated the temperature equivalent to the eruption of such a mass (as is observed in the protuberances), with the velocity and the distances measured. Without going into the mathematical details of his calculation, we will only communicate the results. They are that the temperature of the condensed gas under the liquid crust is 80,000° Fah. higher than the temperature of the solar surface above the crust. Further, it is easy to find that the velocity of the masses escaping, in 10 minutes to a hight of 80,000 miles, is 133 miles per second, a velocity 20 times greater than that required, on our earth's surface, to be imparted to a body in order to cause it never to return when thrown upward.

Basing his speculation on the mechanical theory of heat, Zoellner finds the mean temperature of the solar surface to be 40,000° Fab., which is so high that iron must exist in the solar atmosphere as gas, and all chemical affinities between different substances must be totally suspended, which, in modern science, is called the condition of dissociation.

The temperature of the inner mass of the sun is therefore about 120,000° Fah.

Zoellner further calculates that, as the pressure on those places where the hydrogen spectrum begins to be continuous is about one quarter of the atmospheric pressure, the pressure of the solar atmosphere on the whole area of its liquid surface must be 134,000 terrestrial atmospheres. But on the inner space whence the protuberances escape, the pressure is 4,070,000 atmospheres; which is so enormous a pressure that, notwithstanding the high temperature prevalent there, the permanent gases, even hydrogen, can exist in a fluid condition alone.

This view of the solar constitution is the only one which agrees with the actual density or specific gravity of the mass of the sun, as determined by astronomy.

A WORKING MAN'S CITY.

An English paper states that on August 3, the first stone of a workman's city was laid with appropriate ceremonies at Wandsworth, England. This city, laid out in lots for 1,200 dwellings, is situated on the Shaftesbury Park estate, and is to be built by the Artisans', Laborers', and General Dwellings Company, established in 1867. The object of the association is particularly to enable workmen to become owners of their dwellings in the course of a stated number of years, by the payment of a small additional rent. The Shaftesbury Park estate contains about forty acres, and is situated near London, on the line of the railroad to Dover, by which road facilities for traveling to and from the metropolis will be afforded. The houses are to be thoroughly drained, and economically but substantially built. Ample school accommodations are to be provided, and a hall for lectures and public meetings is to be built. A coöperative store is to be established, and public houses are to be prohibited. The well known philanthropist, the Earl of Shaftesbury, has taken a great interest in this enterprise, and laid the first stone of the buildings.

We regard the above as an excellent movement, and we wish that something of the kind, on a still larger scale, might be inaugurated here, for the benefit of the poorer class of working men in this city. Their domestic situation is indeed deplorable. Living daily from hand to mouth, their earnings are absorbed by the payment of high prices for poor food, bad clothing and wretched apartments. The very first requisite for their improvement is the provision of good homes, —which they will never provide for themselves. Somebody must do it for them.

The good and the charitable, those who are blessed with a superabundance of this world's luxuries, others who have time to spare and willing hearts to help, might, we think, unite under one effective organization, having for its especial object the erection of suburban cottages, for the purpose here indicated.

It would be practicable for such a society to obtain charitable contributions for the purchase of lands on some of the steamboat or railway lines, accessible to New York, to grade, drain, and erect hundreds of cottages, to be let to working people, under proper sanitary regulations, at rentals merely equivalent to the cost of repairs or maintenance. School houses, reading rooms, and other needful appliances would of course be included in the plan. The operations of such a society might even be extended to the supply of the tenants with food, clothing and fuel at wholesale prices.

NEW CANAL THROUGH FLORIDA.

By authority of the Assembly of the State of Florida, a corporation has been formed with a capital of nine hundred dollars, to be increased to twenty millions of dollars if necessary, for the purpose of constructing a canal and improving the navigation of certain rivers, thus forming a new route for the shipment of goods, by water, from the Atlantic to the Gulf of Mexico. The canal will extend from the St. John's river, through Lake Kerr and the Ocklawaha river to Silver Spring, which is the summit, and where an abundant supply of water exists, thence westerly twenty-four miles to Blue Spring, thence nine miles to Fort Clinch on the Withlacoochee, and down this river, nine miles, to the Gulf. Total, fifty-two miles. It is stated that any required depth of water can be obtained, the lockage will be small, and the expense of construction very moderate. Silver Spring and Blue Spring are the outlets of two subterranean rivers and their supply of water is very constant. Silver Spring is stated to yield a flow of 628,320 cubic feet per minute, which is more than sufficient to supply a canal large enough to accommodate ocean steamers of the largest size.

SCIENCE IN COURT.

A trial for murder has lately been concluded at Carlisle, Pa., during which some very remarkable incidents, connected with the scientific attainments of the witnesses, were developed. The prisoner, Paul Schoeppe, M.D., an intelligent, highly educated physician, thirty years of age, a graduate of the university of Berlin, had, in 1868, established himself in practice at Carlisle, where his father had previously settled, and was there the clergyman of the Lutheran Church.

Dr. Schoeppe soon acquired the confidence and esteem of the community, and among others made the acquaintance of a maiden lady, Miss Steinecke, seventy years of age. Mutual admiration resulted in an engagement of marriage; the lady made a will, bequeathing her fortune of fifty thousand dollars to the doctor. They were shortly to be married, intending to leave at once for Europe to avoid the annoyance of the gossips. But their plans were frustrated by the sudden death of the lady, who was taken ill and died within twenty-four hours, attended by Schoeppe and another physician named Herman. No suspicion of death from any other than natural causes appears to have been harbored by anybody until some time afterward, when the relatives of the deceased filed, for probate, an old will by which the property of the deceased was to come to them. Dr. Schoeppe now presented a more recent will, made in his favor by Miss Steinecke, and demanded the property. The relatives thereupon raised the cry of murder by poison against him. the newspapers hounded them on, his neighbors were filled with suspicion, and the unfortunate man was arrested, indicted, tried, found guilty and sentenced to be hung. This was in December, 1869. On this trial two experts, Dr. J. S. Conrad and Professor Wm. E. A. Aiken, both of the Baltimore Infirmary, were the chief witnesses against the Doctor, and they testified that they had made careful medical and chemical *post mortem* examinations of the body of the deceased, and found prussic acid present in the stomach, and were satisfied that death had resulted from the administration of that poison. Dr. Herman also testified that, in his opinion, the symptoms shown during the illness of the lady were those resulting from poison.

The criminating evidence, though satisfactory enough to the judge and jury, was considered worthless by intelligent scientific men, the Doctor protested his innocence, and the strongest efforts were made for his reprieve. But his townsmen were firmly prejudiced against him, and there was a popular clamor for his execution. Two days before the appointed time for the execution, however, the Doctor's friends succeeded in obtaining a reprieve from the Governor, and subsequently a new trial was ordered, which has just taken place, resulting in the triumphant acquittal of the prisoner. On this second trial the three original witnesses, Conrad, Aiken, and Herman, were again brought forward, but this time they were subjected to a straightforward cross examination, during which they were compelled to give to the Court the most particular details of their alleged *post mortem* examinations, and were closely questioned as to the state of their actual knowledge in regard to the nature and action of poisons upon the human system, the symptoms of its presence and the proper methods of its detection. It clearly appeared from these questionings that the three witnesses were, confessedly, a trio of ignoramuses, not posted in the sciences pertaining to their own professions, and unqualified to give to a jury any reliable information in regard to the subjects they were so solemnly called upon to testify.

For example, Dr. Conrad testified that he had made a careful *post mortem* examination of all the important organs of the body of the deceased, such as the brain, heart, liver, and stomach, which he pronounced healthy. But, on cross examination, he said that *he had not examined any of these organs under the microscope.*

He stated that he found the heart healthy, but he had not examined it under the microscope, and was not apparently aware of the important fact, testified to by Professor Wood for the defence, that it is impossible for the best pathologist to decide that the walls of the heart are healthy unless a microscopic examination is made. Granular degeneration has been found by means of the microscope to exist, when to the unassisted eye, the heart looked perfectly healthy. Professor Wood also showed that some of the most common causes of sudden death are to be found in the kidneys and spinal cord; but these organs Dr. Conrad had failed to examine.

In regard to the brain, Dr. Conrad had also failed to make any careful examination, because he did not notice how much blood ran out of it when it was opened, and therefore could not tell whether there had been any congestion.

It was shown for the defence, on the highest medical authorities, that almost any disease of the brain substance may be bidden, without causing any notable symptoms, and the subject be suddenly stricken down with stupor and unconsciousness, without convulsions, gradually deepening into death—which were the symptoms of the deceased. It was also shown that softening of the brain or change in the small vessels can only be ascertained with absolute certainty by microscopic examination, which had been wholly neglected by the witnesses for the prosecution.

The testimony of Professor Aiken for the prosecution, in reference to the finding of prussic acid in the stomach of the deceased, was a lamentable confession of his chemical ignorance and careless manipulation. On his direct examina-

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tion he testified, positively, that he had found prussic acid actually present in the stomach of the deceased; but on being cross-questioned and required to give the details of such finding, he admitted that he did not actually extract any of the prussic acid at all; but what he did was to mix a solution of potash, sulphate of iron, and muriatic acid with some of the juices distilled from the stomach of the deceased; these solutions, he said, when mixed with anything containing prussic acid, give a blue color; and as he obtained this color, he was satisfied that prussic acid was present. "All I did," he swears, "was to satisfy myself that a blue color resulted, and that satisfied me that prussic acid was there." He then made a vapor test and got a red color, which confirmed his previous test, he thought; finally admitting that he obtained only the merest trace of color in both tests. The nitrate of silver test, which is admitted by intelligent chemists to be the best test of all for prussic acid, was not used by Aiken.

It was shown for the defence, by the testimony of Professor John J. Reese, LL.D., of the University of Pennsylvania, that the saliva, which would naturally flow into the stomach of the deceased, was capable of producing the same results that Aiken had alleged that he found, and it further appeared that the colors had probably been introduced into the liquids by Aiken himself, by careless manipulation, and did not result from the presence of prussic acid. Dr. Reese further showed that in a chemical analysis, in such a case, it is the duty of the chemist to be so thorough, so complete, so exhaustive, as to leave no test untried. He further showed that Aiken had completely failed in this, and pointed out his errors in the processes of distillation, in which all the recognized tests for the presence of prussic acid had been omitted. The most overwhelming medical evidence was also presented for the defence, showing that the prosecuting witnesses were not properly informed as to the symptoms produced by poisons upon the human system. Finally it was conclusively proven that the symptoms exhibited by the deceased were those occasioned by natural causes, namely, the contraction of the kidneys, resulting in the injection of uric acid into the blood, which produced serous apoplexy or congestion of the brain—of which the patient died. The evidence for the prosecution was completely broken down, and the prisoner was acquitted by the jury, and is now free.

The Chief Justice remarked that he considered the evidence against the Doctor so feeble that, had it been presented to him on the hearing for binding over to answer the charge, he could not see how he could have done so, further remarking that he "believed that it was God's providence which alone had saved the Court and former jury from committing a great wrong."

The Doctor has renewed his application for the probate of the will, and it is to be hoped he will receive the fifty thousand dollars bequeathed to him. It will be a poor recompense for the terrible ordeal through which he has passed, for the three long years of imprisonment that he has suffered, and for the loss of his business, reputation and property.

Some of our cotemporaries, we observe, in commenting upon the evidence in this singular case, express the opinion that scientific knowledge is, after all, of little practical value; for it appears that experts are always to be found who are ready to contradict each other in testifying upon a given statement of facts. But this, we think, is an erroneous deduction. An intelligent cross-examination will invariably demonstrate whether the expert is really a man of knowledge and science, or only an ignorant pretender. If the latter, his contradictions will have no weight, will perplex no intelligent mind. The importance and value of thorough scientific training, and its utility in the detection of professional fraud, ignorance, and humbuggery, has, in our opinion, seldom been more strikingly exhibited than on this remarkable trial.

THE FAIR OF THE AMERICAN INSTITUTE.

The same delay in forwarding and arranging goods for exhibition, which has rendered the first two weeks of all previous Fairs of the American Institute periods of disorder and confusion, seems to have been the case in the exhibition of this year. In spite of the increased demand for space and the consequent crowding that must later ensue, exhibitors manifest the same inexcusable tardiness, so that we scarcely hope to see the Fair well under way, with all its departments complete, much before the time allowed for its duration shall have half expired. Although we miss several articles and processes of manufacture that formed prominent points of interest in the exhibition of last year, others have filled their places; so that, in general popularity, there is every reason for the present exposition to equal if not excel its predecessors. The interior of the building, late the Empire Skating Rink but now the property of the American Institute, has been renovated and redecorated. No additions to its already large area of floor space have been made, although the mode of arranging the articles in the separate departments is somewhat altered. The general decorations consist of the time-honored red, white and blue draperies, national flags, etc., and the scenic effort of doubtful excellence on the large arch at the further end of the hall. The roof of the building has been painted in appropriate colors, which is a decided improvement over the bare woodwork of former times. The usual Matthews soda water fountain occupies a central position in the hall, and is surmounted by a colossal female figure. The latter, we hope to see speedily removed. In our opinion it has no artistic merit; it is rough and apparently unfinished, while its false or rather want of proportions show a lack of knowledge of anatomy on the part of the modeler which the immense size of the statue renders still more glaring. While it is possible to obtain in this country the works of such sculptors as Powers, Palmer and scores of others of equal or less note, there is no necessity for forcing into prominence any such caricature on the plastic art. Illumination at night is effected by means of the new oxyhydrogen gas which, carried through the building, gives an admirable light.

In recording our notes jotted down during several visits to the exhibition, we shall, according to our usual practice, begin with the department of machinery, mentioning whatever it contains of novelty and interest, and then proceed through the other divisions in regular succession. Professor R. H. Thurston, of the Stevens Institute, Hoboken, N. J., the author of the excellent series of letters ended in this number of our journal, is the chairman of the Committee of Managers in charge of the machinery. He is ably seconded in the executive portion of his duties by Mr. R. H. Buel, the superintendent of the department, through whose efforts the arrangement of this part of the Fair has been conducted with unusual vigor. Of

STEAM BOILERS,

but three are in position. The small Root safety boiler, on the right hand side of the entrance to the boiler room, is the one used in the previous exhibition. Facing it, is a larger boiler of the same pattern, of 200 horse power. A Phleger non-explosive boiler is also in place, supplying steam. In this generator, there is a constant circulation due to the position of the water tubes, some of which are under the fire, while the internal arrangements are such that dry steam is always afforded. The

STEAM ENGINES

are not so numerous as they were last year. An admirably built 80 horse power Wright horizontal engine occupies the most prominent place and supplies the power to other machinery by means of two 3 inch triangular belts. The latter form a new and effective mode of transmitting power, and are claimed to possess many points of superiority over the flat belt. The best oak tanned leather is used, made, for the above mentioned size of belt, of 5 ply with long laps. For belts of smaller dimensions, 3 or 4 ply leather is substituted. The pair referred to, as used at the Fair, are claimed to equal in every respect the 20 inch single belt of last year. On the opposite side of the passage way from the Wright machine is a 50 horse power horizontal engine, from the Newburgh Steam Engine Works of Messrs. Whitehill, Smith & Co., of Newburgh, N. Y., which is fitted with an adjustable cut-off worked by eccentrics and a Shive's governor, which will be described hereafter.

The Yale Iron Works exhibit a 10 horse power vertical engine which, if we may judge from its noiseless and equable motion, is excellently constructed. The Erie City Iron Works present a 15 horse power horizontal engine, remarkable for its compactness of form. The steam and water pressure engine of Messrs. King & Mulock, of Middletown, N. Y., is a recent invention of very simple construction, having but a single valve. As its name indicates, it can be run by either water or steam pressure, and, it is claimed, at a very low cost. The well known Baxter engine, manufactured by the Colt Arms Company, of Hartford, Conn., is displayed in its various sizes. It attracts a curious crowd, and is the recipient of well merited praise from all quarters. Other excellent portable engines are those from the Ames Iron Works. The larger sizes are especially adapted for use in saw mills. Two machines are exhibited of ten and three horse power respectively.

PROFESSOR R. H. THURSTON'S LETTERS.

The last of the interesting series of letters written by Professor Thurston for the SCIENTIFIC AMERICAN, during his recent western tour, will be found in another column. We much regret the necessity which brings this correspondence to a close, for it has been full of interest to our readers, furnishing them with the latest information concerning the improved processes now in vogue in metallurgy, as practiced at the leading establishments, with observations relating to the situation of the mineral supplies upon which many of the metallurgic industries of our country depend. Our correspondent has arrived at his home in Hoboken, N. J., and resumed his accustomed duties as Professor of Mechanical Engineering in the Stevens Institute.

PATENT OFFICE ITEMS.

Assistant Commissioner of Patents J. M. Thacher, after several weeks' absence, has returned to his post, and will administer the duties of the Commissioner while the latter is away in the West, whither he has gone in the interest of the Government.

Competitive examinations which have recently taken place at the Patent Office have resulted in the following appointments and promotions: Major Z. F. Wilber, lately first assistant examiner in-chief of the class of Mills, Glass, and Clay, has been promoted to be principal examiner in the same class, to fill the vacancy made by the resignation of T. C. Folger; F. L. Freeman, W. Osgood, L. N. E. Cooke, and J. B. Darnall are appointed second class clerks in the examining corps.

Professor H. H. Bates, examiner, has taken charge of the class of Civil Engineering.

CAR COUPLING DANGERS.

The suggestions heretofore made by us on this subject have called forth a variety of communications from correspondents, some of which we shall publish. One of these, signed "Brakeman," will be found in our present number. It is the production of a brakeman now working on the Erie railway, and is a model of excellence. The clear intelligent manner in which the subject is discussed is very creditable to the writer. Communications of this kind, from practical men, we highly value.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per Line will be charged.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin, $4 00 a year. Advertisements 17c. a line.

I want a partner with capital in Bolt Machinery, also some parties to make machines with good facilities, fully developed. John R. Abbe, Providence, R. I.

Pipe Cutters, equal to Stanwood's, for cutting off iron or brass pipe. Price, ⅛ to 1, $2.50. Apply to G. Abbott, 31 Devonshire Street, Boston, Mass.

Wood turning Lathes, cheap. Wm. Scott, Binghamton, N.Y.

Wanted—A Power Pump to raise water 45 feet into a Tank to supply a 25 H.P. Locomotive Boiler. Send Circular and Price List to D. B. Cade, Jr., Danburg, Wilkes County, Georgia.

Bar Mill Roller Wanted—In an old established mill of first rate reputation. A first class roller in every respect, steady and attentive, and competent to any rolling of Bars and Bands. Steady work and healthy, pleasant locality. Address L. W., care of Box 3870, N. Y. City.

Wanted—Two Axle Lathes without back Gear and with broad faced cones. Address Ahlborn, Neckerman & Co., Keystone Axle Works, Pittsburgh, Pa.

Large lot of Machinery for Sale. See adv. of Geo. Place & Co.

Wanted—To manufacture a small article of wood. Sanborn & Weeks, Littleton, N. H.

Wm. Burghart, 125 Grand St., Paterson, N. J., wants to find parties who will manufacture a new and valuable invention.

Gear Charts, 50 cents. E. Lyman, New Haven, Conn.

Models and Patterns of all kinds made in the best manner at lowest prices. Geo. B. Kilbon, 35 Market St., Springfield, Mass.

Whitcher's Pat. Rotary Engine is the simplest, cheapest. On exhib'n at P. Fields & Son, North Point Foundry & Mac. W'ks, Jer. Cit., N. J.

Ashcroft's Original Steam Gauge, best and cheapest in the market. Address E. H. Ashcroft, Sudbury St., Boston, Mass.

Diamond Carbon, of all sizes and shapes, furnished for drilling rock, sawing stone, and turning emery wheels or other hard substances also Glazier's Diamonds, by John Dickinson, 64 Nassau st., New York.

Engineering and Scientific Books. Catalogues mailed free. E. & F. N. Spon, 446 Broome Street, New York.

Steel Measuring Tapes, manufactured and sold by W. H. Paine, Greenpoint, N. Y. Send for circular.

Heydrick's Traction Engine and Steam Plow, capable of ascending grades of 1 foot in 3 with perfect ease. The Patent Right for the Southern States for sale. Address W. H. H. Heydrick, Chestnut Hill, Phila.

Tested Machinery Oils—Kelley's Patent Sperm Oil, $1 gallon; Engine Oil, 75 cts.; Filtered Rock Lubricating Oil, 75 cts. Send for certificates. 116 Maiden Lane, New York.

Foundry Facings of extra fine quality manufactured and for sale by Herbert & Co., Bloomsbury, N. J.

The Berryman Steam Trap excels all others. The best is always the cheapest. Address I. B. Davis & Co., Hartford, Conn.

Wanted—Copper, Brass, Tea Lead, and Turnings from all parts of the United States and Canada. Duplaine & Reeves, 760 South Broad Street, Philadelphia, Pa.

Kelley's Chemical Metallic Paints, $1, $1·50, $2 per gallon, mixed ready for use. Send for cards of colors, &c., 116 Maiden Lane, N. Y.

For Hydraulic Jacks and Presses, New or Second Hand, send for circular to E. Lyon, 470 Grand Street, New York.

For Steam Fire Engines, address R. J. Gould, Newark, N. J.

Old Furniture Factory for Sale. A. B., care Jones Scale Works, Binghamton, N. Y.

Kelley's Pat. Petroleum Linseed Oil, 50c. gal., 116 Maiden Lane.

Brick and Mortar Elevator and Distributor—Patent for Sale. See description in SCI. AMERICAN, July 20, 1872. T. Shanks, Lombard and Sharp Streets, Baltimore, Md.

Brown's Coalyard Quarry & Contractors' Apparatus for hoisting and conveying material by iron cable. W. D. Andrews & Bro, 414 Water st., N. Y.

Ashcroft's Self-Testing Steam Gauge can be tested without removing it from its position.

Peck's Patent Drop Press. Milo Peck & Co., New Haven, Ct.

Williamson's Road Steamer and Steam Plow, with Rubber Tires. Address D. D. Williamson, 32 Broadway, N. Y., or Box 1809.

Belting as is Belting—Best Philadelphia Oak Tanned. C. W. Arny, 301 and 303 Cherry Street, Philadelphia, Pa.

The Berryman Heater and Regulator for Steam Boilers—No one using Steam Boilers can afford to be without them. I. B. Davis & Co.

Steel Castings to pattern, strong and tough. Can be forged and tempered. Address Collins & Co., 212 Water St., New York.

For 2, 4, 6 & 8 H.P. Engines, address Twiss Bro., New Haven, Ct.

T. R. Bailey & Vail, Lockport, N. Y., Manf. Gauge Lathes.

Walrus Leather for Polishing Steel, Brass, and Plated Ware Greene, Tweed & Co., 18 Park Place, New York.

Brown's Pipe Tongs—Manufactured exclusively by Ashcroft, Sudbury St., Boston, Mass.

American Boiler Powder Co., Box 797, Pittsburgh, Pa., make the only safe, sure, and cheap remedy for 'Scaly Boilers.' Orders solicited.

Windmills: Get the best. A. P. Brown & Co., 61 Park Place, N. Y.

Boynton's Lightning Saws. The genuine $500 challenge. Will cut five times as fast as an ax. A 6 foot cross cut and buck saw, $4. E. M. Boynton, 80 Beekman Street, New York, Sole Proprietor.

Betterthan the Best—Davis' Patent Recording Steam Gauge. Simple and Cheap. New York Steam Gauge Co., 46 Cortlandt St., N. Y.

The Berryman Manf. Co. make a specialty of the economy and safety in working Steam Boilers. I. B. Davis & Co., Hartford, Conn.

For Solid Wrought-iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

For hand fire engines, address Rumsey & Co., Seneca Falls, N. Y.

All kinds of Presses and Dies. Bliss & Williams, successors to Mays & Bliss, 118 to 122 Plymouth St., Brooklyn. Send for Catalogue.

Mining, Wrecking, Pumping, Drainage, or Irrigating Machinery, for sale or rent. See advertisement, Andrew's Patent, inside page.

Portable Baths. Address Portable Bath Co., Sag Harbor, N. Y.

Presses, Dies & all can tools. Ferracute Mch Wks, Bridgeton, N. J. Also 2-Spindle axial Drills, for Castors, Screw and Trunk Pulleys, &c.

To Ascertain where there will be a demand for new Machinery, mechanics, or manufacturers' supplies see Manufacturing News of United States in Boston Commercial Bulletin. Terms $4·00 a year.

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ON TRIAL!!! The new INDEPENDENT $2.00 monthly, "THE SCIENCE OF HEALTH," sent three months for 25c.! by S. R. WELLS, 389 Broadway, N. Y.

Facts for the Ladies.—Mrs. Thos. L. Smith, Wellsville, N. Y., has used her Wheeler & Wilson Lock-Stitch Machine eleven years, without any repairs, and one needle—No. 2—for nearly five years. See the new Improvements and Woods' Lock-Stitch Ripper.

Notes & Queries.

[We present herewith a series of inquiries embracing a variety of topics of greater or less general interest. The questions are simple, it is true, but we prefer to elicit practical answers from our readers.

1.—EXTRACTING SILVER FROM WASTE PRODUCTS.—I have a quantity of chloride of silver, containing also cream of tartar and common salt. How can I convert this into pure silver, or into the nitrate?—J. H. P.

2.—BLEACHING SHELLAC.—I am using shellac varnish for varnishing my negatives, but it gives them a color which I do not like. How can I remove the color, or bleach the shellac?—L. Q. B.

3.—DISSOLVING SHELLAC.—Is there any process by which shellac can be dissolved in water? Is there any way in which more than the usual amount may be dissolved in alcohol?—L. Q. B.

4.—PAINTING TIN ROOFS.—What paint is best for tin roofs? What time of the year is best to put it on? Should the old paint be removed before the new is applied? How long ought the best paint to last on a tin roof?—L. M.

5.—FREAKS OF BOILERS.—On August 16, 1871, we began to use a second hand boiler; in a few weeks, it began to leak, and the iron showed fine cracks. We had a patch put in, and it gave out in a few days. Then we put in a new sheet; it lasted a few days, bulged badly, and sprung a leak. Then we put in a new boiler, made of the same iron as the sheet put on the old boiler, and fired up at 6 o'clock A. M. At 3 P. M. two sheets bulged; we put in two new ones, and ten hours afterwards these were as bad. We then put in three new sheets; these ran for a few days and then gave out. A boiler inspector says that it was the fault of the fireman; can this be so?—G. &. B.

6.—BURNING GAS.—I have an ordinary gas fixture burning 5 feet of gas per hour, and if I attach, by a piece of rubber tubing, an argand burner, I get more light. Can I possibly burn more gas per hour than I did before the argand was attached? It has been asserted that the argand greatly increases the draft and has the same effect as though the pressure was increased in the street mains. On the other hand, it is claimed that no more than 5 feet of gas can come through a 5 foot burner. How is it? Argand burners would be more frequently used but for the impression that they are very much more expensive.—M.

7.—HYDROGEN LAMP.—Your description of the hydrogen lamp will not, I fear, satisfy expectation. It requires refilling too often, and sulphuric acid is difficult to procure in country places. The commercial acid sold in the shops is valueless, as it acts but very feebly on zinc. I therefore propose, as a substitute for the hydrogen lamp, a battery and a platinum wire (if practicable) and I would like to ask if a platinum wire heated to whiteness by a battery will ignite an alcohol or kerosene lamp? What kind of battery would be most suitable and least expensive for this purpose?—J. H. P.

8.—EXHAUST STEAM IN A STEAM JACKET.—Some engine builders surround their cylinders with a chamber through which the exhaust steam is passed, imagining that such jacketing affords protection against loss of heat from the cylinder. I have long suspected that this was a mistake, and that the exhaust steam would carry away more heat than would be radiated from the naked cylinder, even in cold weather; but I am not in possession of any data from which I can estimate the extent of such loss, if any. Can you or any of your readers give me or refer me to any? Some builders take special pains to avoid all contact between the exhaust steam and the shell of the cylinder, while others, among whom are some prominent eastern builders, seem to be indifferent in the matter.—J. W. T.

9.—DIAMONDS IN NEW MEXICO AND ARIZONA.—Reports come to us daily of the discovery of diamonds in these territories, and as but little is known about them, will some one please give us information? 1st. What are the origin and formation of diamonds? 2nd. In what localities are they mostly found, high, low, or level, among rocks or gravel? 3rd. What is the best manner of determining or testing which are true diamonds in the rough? 4th. How is the value ascertained? 5th. What is the best manner of locating or taking up claims, as there seems to be no law relative to locating diamond mines in the United States? A large party of miners will go this fall from Elizabethtown, New Mexico, and they know but little of the mode of diamond mining or hunting, although they are well versed in regard to minerals in general.—H. M. P.

10.—BOILER SCALE.—I am running a boiler, 36½ feet long, 4½ feet diameter, with five flues, three of 11 inches, and two of 14 inches. The flues prevent my cleaning it from the inside. There is a hand hole at each end of the boiler, likewise a man hole. The boiler in question has been running three months, the water used is brackish, and has a muddy appearance. In cleaning our well, we get nothing but white sand. The scale or deposit in the boiler is nearly three thirty-seconds of an inch in thickness. I have tried the much talked of anti-incrustators, but without effect. I have also tried potatoes; I put in half a bushel, but perhaps that was not enough. A couple of weeks since, I took out several pieces of this deposit; one piece I put into pure, another in diluted, sulphuric acid. After standing 6 hours they remained undissolved. I had thought before this trial that the scale was lime and salt, but find now that it is nothing but white sand along with a small quantity of clay. I have tried to settle the water, but after standing a couple of weeks, it presents the same muddy appearance; but no matter how cloudy it is, if the rain beats into the tank for but one hour, it will, in a few hours, be so clear that the bottom of the tank can be seen. Now what acts so magically upon this water? Is it not the ammonia in the rain water? If so, cannot I settle it by using ammonia or alum? and how much is necessary for a 60 barrel tank? We removed a locomotive boiler about three months since; the deposit on the sides of the fire box was one fourth inch thick. I wish to find something to suit my case. Every day the boiler gives more trouble in raising steam, and I know the time will come when it will be almost impossible to keep up steam. I know there are many others in a like situation, and if you could give us any advice it would be thankfully received.—E.

11.—CEMENTED FLOORS.—A few months ago I cemented the bottom of my cellar, which had always been dry, clean, and noted for keeping every thing put into it in a satisfactory condition. Now it is all changed. Moisture gathers and remains on the cemented bottom, the whole cellar is damp, moldy, and unwholesome, and nothing will keep. The ventilation is the same as before the bottom was cemented, namely, by windows. It has been suggested that I cement the side walls, which are of limestone laid in ordinary mortar, to keep out the moisture which perhaps was formerly absorbed by the earth floor or bottom. What do you think will be the proper remedy?—J. C. W.

12.—CONSTRUCTION OF LIFE BOATS.—Concerning the necessary points essential in constructing a life boat, let me ask, as nearly all the accidents occur upon steamship routes, or routes frequently travelled: If passengers can only be kept safely afloat until a passing boat picks them up, is it necessarily essential that a mode of propulsion be attached to a boat? Judging from the difficulty of keeping a life boat headed to windward, will a life boat left to follow its own motion lie lengthways in the roughs of the waves, and duly assume another position when guided by the rudder? Could not a lifeboat, upon a plan allowing the necessary amount of provisions and water, means of signaling, etc., easily launched, capable of riding the waves in the severest storm without fear of capsizing or swamping until succor comes to the passengers from passing boats, be built? I am at present engaged on the plans of a life boat possessing these merits, and I desire to hear some opinions on the subject before completing them.—L. S. F.

13.—RHEOSTAT.—I wish to construct a rheostat or resistance indicator to be used in connection with a galvanometer for testing telegraph lines. Will some one who has a good one please describe it so that any good mechanic can construct one like it? I wish to know what alloys are generally used for the resistauces, and in what form. Is it a very fine wire, insulated with cotton or silk, and wound in a coil with the resistances measured off and a switch between each so as to make the combination? What length of wire of some particular number and composition has 10 ohms resistance? I cannot find any details in any text book to which I have referred.—S. C. D.

14.—DISSOLVING GLASS.—Will some of your readers give directions for dissolving glass so that it can be used with a paint brush, and tell me how it should be done so as to retain its original gloss? Can coloring matter be used with it?—D. R.

15.—EXTERMINATING SNAILS.—What is the best method of destroying and preventing snails in wells?—J. A. D.

16.—WATERPROOFING LEATHER.—How can I make thin calfskin leather waterproof?—F. C.

Answers to Correspondents.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries however, when paid for as advertisements at $1·00 a line, under the head of "Business and Personal."

ALL reference to back numbers must be by volume and page.

CAR FARE BOXES.—C. H. R.'s suggested improvement is already in use.

PACKING AND BLACK POLISH.—E. should consult our advertising columns.

D. F. McE.—We are indebted to this correspondent for a very fine insect specimen. He desires to know what it is. Answer: It is the *dynastes tityrus* of entomologists, one of the largest beetles within the United States. It belongs to the same family as the sacred *scarabæus* of the old Egyptians.

C. W. P., of Dakota, writes: Enclosed please find a number of different kinds of rock, found near Sioux Falls, Dakota Territory. Please inform me if they are of any value. Answer: The specimens are quartz, except the yellow one, which is chalcedony; neither is of any value.

J. N., of Texas, writes: Will you please inform me what kind of ore is the enclosed? We have an abundance of it in our neighborhood. Answer: It is the red hematite ore of iron, which often occurs in concentric layers. It is a very rich ore.

H. A. S., of Me., writes: Please find a solid substance enclosed which a lady found in an egg. I presume it is a piece of coagulated albumen, but I cannot imagine how a portion of the albumen should become coagulated in a fresh raw egg. Can you? Answer: The specimens are condensed portions of the yoke, not "coagulated albumen." We have a similar example on a larger scale in our possession. They consist mainly of globules of oil.

G. W. G., of Ill., writes: Enclosed you will find a mineral specimen found on a relative's farm near Galena. I request you to inform me what it is. It is found in a meadow (lowland) with a spring close by; what quantity there is, I cannot tell. We have had a bucketful tried in the stove and it seems to burn well, but I am at a loss to say what it is. Answer: It is asphaltum, resembling the celebrated deposits in New Brunswick and Tripidad. If abundant, it is valuable.

R. & T., of Georgia, write: We here hand you a sample of what we term, for want of a better name, a mineral polish in its crude state. We have tested it as a polish upon steel, brass, etc., with results highly satisfactory to us. We have burned it, and find that it stands the strongest fire test we can apply without being affected in the least. Answer: The specimen consists mainly of quartz in a finely comminuted state. It differs from tripoli in not being of animal origin. It has probably resulted from disintegration of some granitic rock. It is softer than emery, but for many purposes it would make an excellent polish.

J. L. S. says: On page 160 of your current volume, in an article on writing fluids, you mention the use of chromate of potash (not bichromate). I am a maker of ink, and I want to make an experiment, and I can find no druggist who has or knows of the chromate of potash. Can you tell me where it can be had? Answer: Chromate of potash is a very common substance, and can generally be had of all dealers in drugs and dyestuffs. You can make the chromate by adding potash to the bichromate.

MOUNTING MAPS.—To J. B., of Mo.—In pasting cloth to maps, take common muslin, cut it to size, lay it on a smooth, clean board, and sponge it with water till it lies quite smooth on the board. Paste the map and lay it on the muslin, then rub carefully with a clean cloth till all the air bubbles and wrinkles are gone. Leave it on the board till quite dry, when it will almost fall off and be perfectly smooth.—F. H. W., of Mass.

COMBUSTION OF COAL.—J. S. J. asks how many cubic feet of atmospheric air are required to produce perfect combustion of one pound of coal, bituminous or anthracite? How many feet of air are usually passed, in ordinary practice, through the fire box of a locomotive or stationary engine, for each pound of coal consumed? Answer: 150 cubic feet of air are required for the perfect combustion of one pound of bituminous coal and 30 per cent more air for one pound of anthracite. Perhaps some of our locomotive friends will tell us how much air is generally passed through the fire box of a locomotive.

VERMIN IN DRIED FRUIT.—M. S., query 23, page 138, should put the fruit in a pan and set it over a kettle of boiling water until it is hot enough to kill any insect that may be in it. Then keep the fruit in a thick muslin or paper rack carefully tied or pasted that the worms may be kept out; but it will retain its taste longer if it is put in an airtight jar.—E. E. S., of O.

VARIATION OF THE POLE STAR.—L. H., query 3, page 106, is informed that the present distance of the pole star from the zenith of the pole is one degree thirty minutes.—H. W. G., of Mich.

CUTTING GLASS.—To J. W. A., query 18, page 153.—Cut from the edges of your glass a number of lines to the edge of your circle, taking care not to cross it. Tap gently with a knife or key, and the outer glass will come away in pieces as divided by the lines. Do not cut twice in a place, and do not try to cut both sides.—J. W. P., of N. J.

WATER VERMIN.—To A. H. R., query 19, page 138.—Go to the nearest river or pond, and with a small net (a piece of old mosquito bar will do) collect a dozen or more of the small fishes known as minnows and put them in your cistern, and, in a short time, you will have clear water, the wiggle tails and reddish colored bugs or lice being gobbled up by the fishes.—M. O'R., of Texas.

PAPIER MACHÉ.—W. P. F. will find the information he seeks on page 16, current volume of the SCIENTIFIC AMERICAN.—F. S. B., of Me.

STAINS ON BLACK MARBLE.—To S. M. T., query 1, page 153.—Wash with a damp sponge; when dry, touch each spot with a solution of shellac in alcohol colored with a little fine lampblack, and continue to do so until the spots are hidden. Then rub lightly with soft cotton slightly moistened with alcohol until you have a fine polish.—E. H. H., of Mass.

NITRO-GLYCERIN.—To O. I. K., query 9, page 153.—Nitro-glycerin cannot be exploded by a common safety fuse.—E. H. H., of Mass.

BISULPHIDE OF CARBON.—To W. H. P., query 14, page 153.—This liquid can be used with safety for the purpose mentioned. It is made by distilling sulphur over red hot charcoal. It can be got from any manufacturing chemist.—E. H. H., of Mass.

SPECIFIC GRAVITY.—To J. P., query 15, page 153.—A body will weigh the same at the equator as at the poles, and specific gravity is the same without reference to latitude.—E. H. H., of Mass.

FLEAS.—I would suggest to T. J. W., query 6, page 153, one method of getting fleas out of the house. Work on the principle of the old adage that the hair of the dog will cure the bite. Our dog carried them away by being allowed to remain in the house through the night. I wash him thoroughly with strong soapsuds, then allow him to remain in during the night. The flea has a great affection for the dog, and consequently in the morning I find him well stocked, and I again take him out for another scrub. This continues to be the case as long as there is a supply of insects.—T. R. J., of Pa.

DETECTION OF SULPHURIC ACID IN VINEGAR.—Vinegars of commerce are frequently sharpened by the addition of sulphuric acid and pungent spices, which can be easily detected by evaporating a half gill in a saucer placed over boiling water. As it boils down, add a little honey. If the grape sugar it contains turns black, it is proof of the presence of sulphuric acid. As the last of the liquid evaporates, the odor of cayenne pepper, etc. (if there be any) can be readily distinguished.—C. H. C., of R. I.

PRESERVING THE EYESIGHT.—To J. H. D., query 18, page 138.—The decay of sight by age is simply a flattening of the eyeball; if you can restore it to its original form, you may dispense with spectacles. I am now near fifty-two years of age, and when I was about forty-five, I found my eyes would get fatigued by reading. I thought I should have to buy spectacles, but just then I saw an article in the *Herald of Health*, "How to restore and preserve the eyesight." The method is this: You shut your eyes, and press the eyeball with the finger and thumb from the outside corner of the eye towards the nose; the finger and thumb must go round the eyeball above and below about five minutes daily. I generally do it before I go to sleep as I lie in bed, because I shall not have to use my eyes again before morning. If you press from the nose outward it will do injury, as that way is for shortsighted people. I have never used spectacles and never expect to; this is written without them by the light of a kerosene lamp.—J. W. P., of N. J.

Communications Received.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

Car-Coupling Dangers.—By C. F. R.

Science and Theology.—By P. D. V.

The improved construction and propulsion of Lifeboats.—By L. S. F.

A Comparison of the Meetings of Religious and Scientific bodies—being a reply to an editorial article in the SCIENTIFIC AMERICAN, on the American Association of Science.—By E. S.

Horse-railroads without rails.—By R. B.

The Polar Sea and its cause.—By J. H. F.

An endless chain of vacuum air cylinders, operating within a water column.—By J. W. S.

Science and Theology.—By M. F. F.

The Day of Rest.—By J. T. N.

On the need of further Legislation relative to the construction of Sea-going vessels.—By W. W.

The late Edward Marcus Chaffee.—By A. R. T.

Force of Falling Bodies.—By G. M. T.

Sulphuric acid in Vinegar.—By R. H.

Old and New Inventions.—By J. H.

Theology and Science.—By G. N.

The need of better mechanism for Cider making.—By E. H

On Animal Heat and Disease.—By A. B. M.

Car-coupling Dangers.—By G. F. W.

Car-coupling Dangers.—By C. S.

Theology and Science.—By J. E. E.

The causes and dangers of Kerosene-lamp Explosions.—By C. M. H.

Life preserving Garments.—By S. H. S.

Cheap Microscopes.—By C. S.

Milk sickness.—Its cause and cure.—By O. S. M.

The frozen well at Brandon.—By C. S.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

SASH HOLDER.—Abraham Perron, of Stevens' Point, Wis.—This invention relates to a new and useful improvement in the mode of supporting and locking window sashes; and consists in a catch made to oscillate by means of a lever, so as to engage with the sash and hold it in any position.

APPARATUS FOR FEEDING THE CHARGE TO METALLURGIC FURNACES.—Giles Edwards, of Tannehill, Ala.—This invention consists in a feeding tube having a charging chamber with a valve at top and another at bottom to graduate readily the amount of fuel and its mixture with the ore, and thus to give the smelter entire control of the quantity and quality of the ascending gases.

BOLT CUTTER.—William F. Strong, of Charleston, S. C.—This invention consists of a peculiar arrangement of the stock, scroll plate, and cap of a chuck for holding and adjusting screw cutting dies or tap holding jaws, whereby provision is made for the application of a scale, adjustable stop bolt, and a stud pin for arresting the dies as they close upon the bolt at any predetermined point, for bolts of any sizes.

WELL TUBE.—Roswell R. Rouse, of Indianapolis, Ind.—This invention consists in making the tubes of cast or malleable cast iron with projecting ribs and perforated, and in soldering over its perforated sides wire gauze of the desired grade, so that, when the perforations are sufficiently large, the change from coarser to finer gauze, or *vice versa*, will fit the tube to serve as strainer in all manner of material.

WHIFFLETREE.—Jacob M. Isenberg, Huntingdon, Pa., assignor to himself and S. H. Isenberg, same place.—This invention consists of a peculiar arrangement of devices with sliding catch bolts on the whiffletree for engaging and holding the traces, whereby the traces may be detached and the horse let go by the pulling of a cord or strap.

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TOOL FOR BELT RIVETING.—Mortimer D. Lawrence, Flintville, Wis.—This invention has for its object to furnish an improved combination tool for use in belt riveting, consisting of handles pivoted to each other, and provided with a cutter, claw, punch, and head.

WATER PRESSURE CHECK VALVE.—Thomas Bailey, New York city.—The fact that water is practically a non-compressible and non-elastic fluid is overlooked by plumbers, and no means are provided to prevent the sudden shocks to which water pipes are subjected when stop cocks are instantly closed and the momentum of a column of water is suddenly checked. This invention is designed to remedy this difficulty, and it consists in a valve in combination with an air chamber. When any stop cock connected with the water pipe is closed suddenly, and the momentum of the flowing water instantly arrested, the pipe will receive no shock nor be in danger of bursting, as the air in the air chamber will receive the shock and be compressed, and hus relieve the pipe. By means of the nut the valve can be adjusted to suit any head of water, and so as to protect the pipe as well as the range boilers connected therewith.

LIFTING JACK.—John J. Stuart, of New York city.—This invention has or its object to furnish an improved jack for raising wagons and other carriages to enable their wheels to be conveniently removed for oiling their axles, and consists of a pipe of suitable length attached to a foot or stand. Within the former slides a smaller tube. Holes are cut in the outer pipe to receive a pin which is inserted beneath the lower end of the inner tube to keep it in place. A lever attached to the exterior pipe has a pawl pivoted to its forward arm. On the free end of this pawl is a hook which passes through slots and takes hold of notches on the inner pipe, thus raising the latter and with it any object under which it may be placed.

SKATE FASTENING.—Edward Lawson Fenerty, of Halifax, Nova Scotia.—This invention has for its object to improve the construction of the improved skate fastenings, for which letters patent No. 121,092 were granted to the same inventor, November 21, 1871, so as to make them more convenient in use, no wrench or key being required to adjust them to any sized boot. The heel of the boot is held in a metallic clamp consisting of a sliding plate actuated by a lever and toothed wheel, which lever may, after being adjusted, be locked. The sole is confined by two side plates which are governed by a third plate resting upon them. This skate can be secured to the foot by a single movement of the lever in the heel piece.

ROCK DRILLING MACHINE.—John Cody, of New York city.—This invention has for its object to furnish an improved steam drill enabling a hole to be drilled in a horizontal direction or at any desired angle; and it consists of the combination of the base plate or frame, hollow post, and branched standard, with the frame of a steam drill to support said drill in such a way that it may operate at any desired angle, also suitable appliances to enable the drill to be fed forward to its work by hand. The drill is fastened to the piston rod in such a manner as to be firmly locked in place and at the same time be easily detached or attached as desired. By other mechanism it is caused to rotate automatically as it moves back after making a stroke.

SUBMERGED PUMP.—David G. Hussey, of Nantucket, Mass.—This invention furnishes a submerged double acting pump, which can be worked at any angle or number of angles, and at any distance from the well or cistern; and it consists in a pump barrel, which is made with flanges at both ends. The inner faces of its heads are recessed to form seats for the valves, which serve as passage ways for the water. The water enters at the upper end of the pump through holes in the head. The piston rod is made hollow. The piston heads are at a little distance apart, and midway between them is a fixed flange. Valves are placed between the piston heads and the flange so as to close the ingress openings for the water through the piston heads, which water passes into the interior of the piston rod through holes in its sides between the piston heads and the flange. The upper part of the piston rod is pivoted to an arm of a three armed lever. The three armed lever is pivoted to any suitable support at the mouth of the well or cistern in which the pump is placed, and its upper arm is extended to enable the pump to be worked from this point when desired. To arms of the lever, at equal distances from its pivoting point, are attached the ends of two rods or chains, which are connected with the ends of the opposite arms of a four armed lever, pivoted to some suitable support at any desired distance from the well or cistern, and at the point where an angle is to be formed in the connecting rods or chains. To the ends of the other pair of opposite arms of the four armed lever are attached the ends of connecting rods or chains, the other ends of which are attached to the operating lever at equal distances from the pivoting point of said lever. In this way any desired number of angles may be formed in the connection rods or chains, so that the pump may be operated from any desired point.

TWEER.—Theodor Gilson, of Port Washington, Wis.—This invention consists of a novel arrangement of the devices comprising a tweer, with a hollow oval headed plug below a large circular opening in the cap, whereby said devices may be adjusted to cause the air to escape both around the oval head in an annular jet, and through the hole of the plug in a central jet, or through either alone, and to vary the quantity discharged through either at pleasure.

SHIRT.—John A. Peters, of Jordanville, N. Y.—This invention relates to the construction of dress shirts for gentlemen's wear; and consists in a device for keeping the bosoms smooth and taking up the slack cloth around the waist. Straps are attached to the body of the shirt beneath the arms, which are buttoned one to the other, which draws the back and the front of the shirt together, so as to bring the surplus cloth between the two straps under the arms.

BAND SAWING MACHINE.—Hosea D. Bliss, of Hamburg, Iowa.—This invention relates to improvements in the class of band sawing machines wherein the saw is so hung as to be inclined from a vertical plane when desired; and it consists, chiefly, in the construction and arrangement of parts whereby the standard carrying the pulleys upon which the saw is mounted may be adjusted at various angles to the reciprocating table with ease, dispatch and certainty. The inventor proposes to use a band saw with teeth of such form that it can be reversed by being turned inside out whenever the teeth are blunt on one side. Regular V-shaped teeth, properly upset, will best answer this purpose.

PUMP.—Frederick R. Lockling, of Hannibal, Mo.—This invention consists of a long hollow pump piston whose lower end has over twice the area of the upper end exclusive of the water openings, and is arranged in two packings with an air or water chamber between, so that the upper part, which works in a chamber into which the water is forced, displaces only half the water the lower part does, to equalize the discharge as much as possible and produce a continuously discharging single acting pump by the aid of an air cushion in the said chamber at the upper part of the piston. The invention also consists of an air and water packing for the piston produced by empty grooves in the piston bearings, into which the water and air work when the piston is operated, and constitute a packing by obstructing an active or direct flow through the slight space between the piston and its bearings. The invention also consists of the application of a dasher to the cistern or well, suspended from the pump handle by a rod into the water below to stir and agitate and mix the air with it to avoid the pumping of dead water.

PLOW COLTER.—William H. Hoefelman, of Columbus, Neb.—This invention relates to a new plow attachment for causing weeds, stalks, and stubble to be covered by the plow while the same is turning the soil, with the object of removing such stalks, etc., from the way of harvesting machines, which they frequently clog, and of utilizing the same to enrich the soil. The invention consists in the use of a colter applied to the plow beam, and combined with a laterally projecting curved arm for turning the weeds, etc., which have been detached by the colter.

NEWSPAPER FILE.—William R. McNorton, of Livingston, Ala., assignor to himself and Thomas A. Johnston of same place.—This improvement in paper files consists of thin metal bars or plates with a series of transverse pin holes attached to one of the paper clamping bars at right angles and passing through the other, and held by pins and keys to clamp the paper fast between said bars, the pins being passed through the said perforated bars at the back of the clamping bar; and the two clamping bars are clamped firmly against the paper by the said keys, which being slotted are driven under the pins against the paper clamping bar along the perforated bars which come in the slots.

BEDSTEAD.—Dennis O'Leary, of Hubbard, O.—This invention relates to a new simple construction of wrought iron bedsteads, whose parts are united together in such manner that the bed bottom can be raised up or down at will.

ELASTIC PAD FOR CORSET.—Benjamin Bernstein, of New York city.—This invention has for its object to furnish an improved adjustable spring pad for ladies' corsets or other articles of dress, which shall be so constructed and arranged that it may be readily expanded and contracted, as may be required, and which shall, at the same time, be light, strong, and durable: and it consists in the construction and combination of various parts, chiefly made of metal wire, forming a device designed to be inserted in a corset between its inner and outer coverings, the wires being secured to one or both said coverings by sewing, by fastening similar to hoop skirt fastenings, or in any other convenient and reliable manner.

SASH HOLDER.—Albert R. Judd, of North Adams, Mass.—This invention consists of a pawl for locking the sash shut, and an eccentric pawl for fastening it open, combined in one piece and pivoted to the sash, with a spring and a pair of inclined planes combined with the pivot of the pawl in such manner that shifting the pawl on its pivot to bring either part into action shifts the spring so that it acts upon the one brought into action to insure its taking hold of the window frame or other part it is to act upon.

BLACKING AND BRUSH HOLDER.—Ephraim H. Sweetser, Salem, Mass.—This invention consists of improvements in the construction of the blacking box and daub brush holders illustrated on page 322, last volume of the SCIENTIFIC AMERICAN, by the same inventor. The inventor has arranged the cover to fit over the outside of the cup instead of inside, as heretofore, for preventing the smearing of the lower edge with blacking, which occurred, when it fitted inside, by the accumulation of blacking in the cup. The apparatus is designed both for shoe and stove blacking and brushes, or other polishing matters.

MACHINE FOR MORTISING BLIND STILES.—Mahlon W. Collins, Enfield, N. H.—This invention consists in combining with a pair of stile mortising tools a table and carriage, both movable longitudinally and independently, but the latter carrying the former in an obliquely forward and upward direction. The inventor states that he has arranged all the driving wheels and belts, likely to be injurious to the attendants, inside of the frame, where they are guarded by it, so that there is but little or no danger of accident.

FLUTING MACHINE.—Edward Mortimer Deey, of New York city.—This invention consists of a construction of hollow rollers having gas burners in the hollow spaces for heating them, calculated to prevent the cutting off of the air supply for combustion by the accidental closing of the hollow ends of the rollers by the goods being ruffled. Second, it consists of an arrangement of supports for the gas tubes, by which the supports therefor, heretofore used at the ends of the rollers, where the goods to be ruffled are presented, and which have to be removed each time the rollers are, are dispensed with. Thirdly, it consists of a very efficient and reliable arrangement of apparatus for suspending the upper roller support and raising and lowering it; also, the adjustable pressure springs therefor.

HEATING STOVE.—Samuel D. Tillman, Jersey City, N. J.—This invention consists in the arrangement of a series of elliptical shaped air tubes parallel to each other across the diameter of the radiating chamber. Also in the arrangement of an air heating chamber between the said tubes and the fire box, whereby the largest possible volume of cold air is claimed to be heated in the least possible time. The tubes are placed side by side within the radiating chamber, in such a manner as virtually to divide the chamber into two compartments—the front compartment, with which the fire pot communicates, being the hot smoke chamber, and the rear compartment being the cold smoke chamber. The formation of the tubes being elliptical is the most favorable for the easy passage of the products of combustion between them. The hot smoke and air are passed between the tubes in thin sheets, owing to the small space between the tubes, so that the loss of caloric from non-contact with the tubes is quite trifling. All of the tubes are heated simultaneously and to the same degree. The heat of the fire cannot be more fully concentrated upon one tube than upon the others. Another advantage of this arrangement of the tubes is that the radiating chamber can never become filled with soot or ashes, for a rod may be at all times passed up through the open door and smoke hole between the several tubes, whereby they may be cleaned expeditiously without taking the apparatus apart or even allowing the fire to go down. This arrangement, therefore, permits the use of wood or bituminous coal for fuel equally as well as anthracite coal.

TAILOR'S CRAYON HOLDER.—John A. Gooch, Biddeford, Maine.—The case is made open at one edge, and of such a capacity as to receive the marking lead or crayon. A slide placed in the interior of the case may, by turning a screw in one direction, be pushed outward to push out the lead or crayon as it wears away, and by turning the said screw in the other direction may be moved inward to allow the lead or crayon to be pushed into the said case. The lead or crayon is kept from dropping out of the case by the spring which bears against its side. The lead or crayon is made thin to adapt it for use in the case without requiring the said case to be made so thick as to be inconvenient in use or in carrying it in the pocket. By holding the apparatus, while using it, inclined to one side for a while, and then inclined to the other side for a while, the wear will keep it sharpened, and the use of a knife for sharpening it will never be required.

MACHINE FOR NICKING RIB COLLARS FOR UMBRELLAS.—Robert Marshall, Philadelphia, Pa.—This invention consists of a feeding and holding disk, which receives and carries the collars to the milling tool for cutting the groove, and then to a nicking saw for cutting the nicks; a mandrel for rotating the collar against the milling cutter by a continuous rotary motion, another mandrel for shifting the collar in front of the nicking saw, and spacing and holding it for nicking, and automatically operating gear, whereby the blanks, which are delivered by hand or otherwise to the aforesaid disk, at intervals as it is intermittingly revolved, will be automatically milled or grooved, nicked, and discharged.

VEGETABLE CUTTER.—Thomas Bolton, Northampton, Mass.—This invention consists of a board or plate with a transverse slot extending nearly across it about midway between the ends, and chamfered or beveled on the under side each way from the slot, so that the walls of the latter are thinned down sufficiently to allow the slices to escape. And over the slot is a double edged cutter, a little narrower than the slot, with both edges beveled on the under side, which said cutter is secured to the board at each end on adjustable bearing plates, which are constructed in two or more parts of different thicknesses for supporting the cutter higher or lower on the board according to the required thickness of the slices to be cut. A guide may be placed along one or both edges of the board to keep the vegetables to be cut from sliding off the edges.

BRUSH.—John Ames, Jr., Lansingburg, N. Y., assignor to John Ames, of same place.—This invention has for its object to improve the construction of wall brushes, known also as flat paint brushes, paste brushes, etc., and which may also be applied to whitewash brushes, so as to produce firmer, stronger, and more durable brushes than the brushes made in the ordinary manner. The butts or roots of the bristles are clamped in the tapering or dovetailed space between the tapering metallic ferrule and the tapering base of the handle, so as to be held firmly and securely in place, rivets or screws preventing the possibility of any of the parts working loose.

BEDSTEAD KEY.—Herrmann Stein, New York city.—This invention has for its object to produce a wrench or key which can be conveniently used on bedsteads for turning the connecting bolts or pins, and whenever a straight or rigid wrench is difficult to apply. The invention consists in connecting the head of the wrench to the shank so as to form a flexible joint, thus permitting the application of the instrument in corners or wherever other ordinary wrenches or keys are difficult to apply. It is a very effective and convenient implement, cheaply constructed of malleable iron and will take the place of the ordinary bed key.

CARD FOR WRAPPING THREAD, ETC.—Hugo Sutro, New York city.—This invention relates to a new form for holding braided or other threads; and consists in notching a card at the ends to produce visible and accurate subdivisions of the skeins wound thereon. This is for the purpose of keeping the skeins so fully separated that they cannot become entangled, and that each skein containing a certain length of thread can be cut apart with its section of card, to furnish a desired measure of thread or braid.

GENERAL JOINER.—David R. Williams, Sr., Paris, Ky.—The invention consists in working lumber across a wood working machine. The supporting frame of the machine does not require more space than about four feet in length and three in width, and is built of substantial wood work. A horizontal carriage is fitted between two horizontal guide rails, on the upper part of the machine, and is connected with a lever which is pivoted to the frame and serves to adjust the carriage back or forward. A horizontal shaft is hung lengthwise in the carriage to receive at its front end the lathe chuck, circular, rip, or cross cut saw, or other tool to be revolved, and is connected with a drum hanging in the lower part of the frame and receiving rotary motion by suitable mechanism, so that the shaft will also be turned. A longitudinal adjustable rest is placed upon two rails of the frame, so that its center pin will be in line with the axis of the shaft. It can be clamped to the rails by suitable means. The carriage can be fastened in suitable position. Vertically adjustable side plates are placed at the sides of the frame upon a separate longitudinally adjustable frame. When the latter is, by means of a screw, moved backward, the plates will be elevated, and they will be lowered when the frame is moved forward. This machine, with proper additions, can be used for tonguing, grooving, planing, molding, and all manner of work.

REFRIGERATOR.—Benjamin N. Hatcheson, of Greenpoint, assignor to Gustave Autenrieth, Hunter's Point, N. Y.—This invention has for its object to improve the construction of refrigerators or ice boxes in such a manner that the escape of the coal filling over the top of the sheet metal lining will become impossible, as well as the entrance of air and moisture from within into the space containing the coal or other non-conducting filling. The invention consists in the use of strips, placed against the flush inner edge of the refrigerator top, and overlapping the face of the sheet metal lining.

BLAST FURNACE CHARGING APPARATUS.—William A. Miles, Salisbury, Conn.—This invention relates to a new apparatus for charging all kinds of blast furnaces with the material to be treated therein, and has for its object to prevent the escape of gases through the charger while feeding the material to the furnace, and also to allow the evening or leveling of the material in the charging vessel. It consists of sliding plates arranged at the bottom of a blast furnace charger, to move simultaneously together or apart, and also a lid combined with the charger and sliding plates which is opened to admit the material to be charged and which, when closed, prevents the escape of gas during the admission of the charge to the furnace.

CULTIVATOR.—Lafayette K. Tipton, Easton, Mo.—This invention, which has for its object to furnish an improved wheel cultivator, consists of a suitably made frame work body resting upon two wheels which revolve on journals in short axles. To the rear of this framework two plow beams are so attached as to be susceptible of both vertical and lateral motion. On each plow beam a handle is fastened and also two inclined standards, on the lower ends of which are shanks and plow plates. By means of a hook attached to either plow beam, hooking in a curved rod on the upper part of the framework, the plows can be supported away from the ground in turning or passing from place to place. The lower portion of the framework is of such a hight as to pass over the tops of all plants, while space is left between the inner ends of the short axles for the passage of the row of plants so that they may not be injured or broken by being struck. The plow plates can be adjusted to throw the soil toward or from the plants and the plows may be arranged to work further or closer to the row under cultivation.

GLOVE ENVELOPE.—Andrew D. Foster, Sayville, N. Y.—This invention has for its object to furnish an improved device for preserving kid gloves from becoming spotted, soiled, faded, mildewed, or otherwise injured while in the hands of the retailer and in the hands of the purchaser, and not in use. It consists in the preserver made in the form of a long narrow envelope, with the flap at one end left loose for the insertion and removal of the gloves. In the body of the preserver is formed a small flap, so that by turning up the said flap the color of the gloves can be seen by the purchaser or user in making a selection. Upon the face of the preserver is designed to be printed the name, or the name and trade mark, of the manufacturer of the inclosed gloves, the number or size of the gloves, or business card of the dealer.

BRUSH RACK.—Edwin F. Ames, Lansingburgh, N. Y., assignor to John Ames, of same place.—This invention has for its object to improve the construction of the brush rack so as to make it more convenient in use. It consists in making the lower cleat stationary, notched upon its forward edge, and provided with buttons. It furnishes a simple and convenient rack for holding painters' brushes. It is adapted for various sized brushes in the same rack, and is useful in every paint shop.

HASP FOR TRUNK LOCK.—Edward L. Gaylord, Bridgeport, Conn.—This invention has for its object to furnish an improved hasp for trunk locks which shall be simple in construction and convenient in manufacture, so constructed as to hold the hasp out, so that, should the trunk lid fall accidentally, the hasp cannot strike against the edge of the trunk body and be broken, bent, or injured; and it consists in the combination of the spring and plate with the hasp and a slotted hasp plate. The spring, placed in the space between the bar and the hasp is bent, and by its elasticity holds the hasp out, the ends of the said spring resting against flanges formed upon the side edges of the hasp to keep the spring in place.

BAG LOCK.—Edward L. Gaylord, Bridgeport, Conn.—This invention has for its object to furnish an improved traveling bag lock, simple, convenient, and so constructed that it may be unfastened with one hand while the other is carrying the bag, so that the bag may be conveniently opened in the street or other place where it cannot be conveniently set down. An inner plate and the case of the lock are secured to each other and to the frame of the bag by rivets which pass through the said case and plate and through the said frame, so that the lock can be attached to the frame after the bag has been finished. In the side of the case is formed a hole to receive a catch which is attached to a block that slides up and down in a recess formed in the inner side of the plate or in a strengthening plate placed upon the inner side of said plate. To the block is attached a knob, the stem of which passes through a slot in the plate. The catch is beveled off upon the lower side of its forward end, and has a shoulder formed upon its upper side. By this construction, as the catch is pushed through the hole in the case, it compresses the spring attached to the plate. As the shoulder of the catch passes within the case, the said catch is raised by the elasticity of the spring so that the shoulder of the said catch may catch upon the side of the case above the said hole, and thus fasten the bag. The bag is locked by a bolt which is pushed forward along the plate so as to pass beneath the spring.

BLACKING BOX HOLDER.—Robert R. Forrest, Washington, Pa.—This invention relates to a mode of holding blacking boxes during the process of blacking boots and shoes; and it consists in a spring handle or holder constructed of band iron of any shape, or round wire, or of wood, and formed by doubling such metal, so that the bend will form a spring. On one or both sides of the legs of this spring handle, a recess is formed to receive the bottom of the box.

COTTON GIN FLUE.—James W. Gaines, Clarksville, Texas.—In this invention, by the arrangement of a valve or set of valves in the flue that leads the lint cotton from the gin stand to the lint room, the inventor proposes to throw the lint cotton into different rooms without stopping the gin. In the ordinary way of ginning, the cotton is thrown into one room, so that the gin has to stop until the cotton in the room is baled or packed. By this plan the gin can be kept running; and if there are more than two rooms wanted more than one valve can be used. By having a partition in the lint room, the cotton can be thrown first into one room, then into another.

STOVE PIPE DAMPER.—Warren Wasson and George W. Dungan, Genoa, Nev.—This invention relates to improvement in the class of dampers and their attachments wherein the damper has its spindle prolonged for a handle or thumb piece by which to turn the damper, and this thumb piece has a stud pin projecting backward toward the pipe, parallel with the journals, to enter any one of a series of holes in a circular line around the axis, for holding the damper closed or open, or partly open, the said pin being introduced to the holes or withdrawn by sliding the damper endwise on its axes. The invention comprises a peculiar arrangement of the supports for the plate having the aforesaid series of holes for attaching it to the end of a section of pipe and allowing the other section to be joined to the one having the said plate attached.

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CAKE PAN.—William C. Butler, of Louisville, Ky., assignor to himself and W. E. Arnold of same place.—This invention has for its object to furnish an improved pan for baking cake which shall be so constructed that the cake may be removed from the pan when baked without being broken even shouldit adhere to said pan; and it consists in the detached bottom and tube, constructed to adapt it to be applied to a cake pan.

BELT SHIFTER.—Toppan P. Rodgers, of Taunton, Mass.—This invention relates to the sliding belt hole covers used around belts running through floors to shift from side to side as the belts shift and keep the holes covered; and it consists of raised ribs or ways on the plate, which is attached to the floor for the shifting cover to rest and move on, with guide pins in the said plate projecting upward through slots in the cover to guide the latter, whereby the said cover is not liable to be clogged so as to obstruct its working freely, as when arranged in dovetail guides as heretofore, and is rendered practically successful. This invention also comprises a connection of these raised ribs or ways at each end of the belt hole by other ribs of the same hight, both for supporting the ends of the sliding cover and for preventing the escape of the water, used in washing the floors, down through the belt hole.

SAP BUCKET BRACKET.—John J. Pellett, of Oconomowoc, Wis.—This invention relates to a new manner of supporting buckets on maple trees by means of vertically adjustable brackets, which are applied thereto without injuring the trees. The invention consists in the use of brackets, which are fastened to the trees by means of wires or cords that embrace the same. By this means the buckets can be applied in suitable position and shifted to different hights from year to year, as may be found necessary.

ROASTING AND DESULPHURIZING FURNACE.—William Bushnell, of New York city, assignor to himself and Joshua Hunt, of Catasauqua, Pa.—In operating this desulphurizing and roasting furnace, the inventor commences by charging carefully a layer of coal upon the grates and placing upon it a layer of ore, and thus alternate with a stratum of coal and a stratum of ore, until the furnace is full up to the lower end of the charging tube; and next he fills the charging tube in same manner, graduating the quantity of coal in accordance with the character of the ore, being careful not to use too much coal. He then makes fires in the fire grates and keeps them up until the coal in the stack is fairly ignited, when they are allowed to go out. The charging of the furnace is thereafter performed through the throats of the charging tube, taking care to keep the tube constantly full. The gases generated in the lower part of the furnace pass up through the ore and coal, gradually intensifying until they reach the surface of the main body of the ore at the commencement of an annular chamber, when they burst into flame, and seizing upon the vaporized sulphur carry it speedily into the atmosphere—a result attained by the use of the charging tube and the open annular chamber surrounding the tube and the boiler, and not reached by any other known plan.

SAWING MACHINE.—Enos Goble Budd, of Budd's Lake, N. J.—This invention relates, first, to a frame for supporting and guiding the saw and its operating mechanism, which is to rest upon and be secured to the log to be sawn; and, secondly, to the arrangement of the said mechanism, the same consisting, in the main, of a novel application of a pair of "lazy tongs," one being always in the act of opening as the other is closing; and, inasmuch as they are connected with the saw, a reciprocating movement of the latter is obtained. There is considerable novelty in this invention and we shall be glad to receive an account of the result when a machine has been put in operation.

PUMP.—James A. Sinclair, Woodsfield, Ohio.—The invention consists in a pump cylinder formed of three tubes, of which the innermost is divided longitudinally, the outermost metallic one is in one piece, and an intermediate one is made of cement. By this construction, the inner sectional tube can readily expand against the cement while the latter furnishes an impermeable enclosure to prevent contact between the liquid and the outer metallic tube.

STEAM BOILER.—Philip Estes, Leavenworth, Kan.—The invention consists in arranging and connecting certain water spaces with a boiler so as to create a heating surface larger than usual, thus economizing fuel and lessening the cost of generating a given supply of steam.

STRAW CUTTER.—John O. Tyler, Roxobel, N. C.—This invention consists of a straw cutter in which the feeding of the straw is effected partly by gravitation and partly by the cutters, which are made to revolve under a hopper with an opening in the bottom, and some of them are provided with hooks on the points or ends for catching the straw and drawing it down to the place for cutting it into short pieces. The invention also consists of a pair of curved slotted plates, combined with the hopper and the cutters for conducting the straw to the place for cutting it; and it also consists of a slotted plate combined with these sliding plates and the cutters.

BUSTLE.—Sherman Smith and Daniel L. Smith, Skowhegan, Me.—In this apparatus the horizontal ribs for swelling or bulging out the dress are supported on one, two, three, or more strong ribs or stays projecting from the waistband and curving downward, and at the waistband they bend downward so as to extend along the back of the wearer a sufficient distance to constitute a rest for a brace for the upper projecting portions. The arrangement of this brace adjustably both on the upper and lower parts of the stays, or either of them, so as to be adjusted to hold the projecting stays higher or lower, and the apparatus for adjusting, comprises the invention.

SAW MILL EDGER.—George Willett, Friendship, N. Y., assignor to himself and J. W. Hilton, of Bradford, Pa.—This invention relates to a new means for adjusting the top frame of a saw mill edger, and also to a new mechanism for regulating the speed of the feed rollers and reversing their motion. It consists, first, in providing the top frame with pendent racks at the ends, and in combining therewith toothed segments on a rock shaft, so that when the latter is turned the frame will be evenly elevated or lowered, to be adjusted to the thickness of the board to be edged.

HEAD BLOCK FOR SAW MILLS.—George Willett, Friendship, N. Y., assignor to himself and J. W. Hilton, Bradford, Pa.—This invention relates to a new mechanism for feeding the head blocks of saw mills in the carriages; and consists in the employment of two reciprocating ratchet bars, which are operated by crank connections with a rock shaft, and with which spring pawls, that are attached to the head block, are in contact, so fashioned that when the ratchets are moved alternately back and forth the one moving forward will actuate the head block in the desired manner, the other ratchet meanwhile moving back to be ready for its next forward movement, during which to actuate the carriage.

STONE SAWING MACHINE.—George A. Davidson, of Malden, assignor to himself and Horace T. Caswell, of Troy, N. Y.—This invention relates to grooved metal bars which are placed on the platform holding the stone under the saw. Said grooves will be deep enough to let the saws, which are not always exactly level, work entirely through the stone from end to end before striking the bottom of the grooves, and thus the inventor saves the damage to the platform or scantlings, placed thereon to hold the stone in the common way, which are so cut up in a short time as to be worthless.

CULTIVATOR.—William R. Robinson, Mattoon, Ill.—This invention consists in the combination of a pivoted step which bolts the handles of a cultivator to the plow beam, also a brace bar which supports the handle at the desired elevation. The middle part of the braces is made flat to rest upon the upper side of the plow beams, and is secured to said beams by a bolt, several holes being formed in said flat or horizontal part to receive the said bolt to enable the handles to be inclined to either side or adjusted in line with the beams, as may be desired.

WAGON STANDARD.—Patrick Sweeney, Cordova, Ill.—In this invention the stake is driven from the cap plate into the socket, and is readily removed by taking out the bolts. The socket and the cap plate being firmly united together and the plate securely attached to the bolster by bolts (one or more) the stake is well supported without mortising the bolster, and is, consequently, readily renewed or changed, as occasion may require.

PAPER CUTTING MACHINE.—Edwin R. Sheridan and Theodore W. Sheridan, of New York city.—In this invention the paper knife is brought down with great force by means of a hand lever, which actuates segments of gear wheels which mesh in the teeth of racks on the bars attached to the blade. The hand lever is released after making a stroke; a weighted lever carries it back and also raises the knife ready to repeat the operation.

SASH HOLDER.—George W. Richardson, of Columbus, Ky.—This invention consists of a long flat spring in a case next to the sash, with a curved bar behind it, and behind said bar a pinion on a knob spindle gearing with the said bar so as to raise or lower it by the turning of the said knob spindle, by which the said bar, which has the ends suitably formed for the purpose, will be caused to wedge at its ends in between the pinion and the spring, and force the latter against the sash; and this spring is faced with roughened india rubber, or other substance, adapted to hold the sash by friction. The upper end of the said bar holds the sash up and the lower end holds it down.

CONVICT'S SHACKLE.—Peter Runquist, of Steilacoom City, Wash. Ter.—This invention relates to the inclosing or boxing of the jaws of the ordinary or Gardner shackle with case hardened or hardened steel boxes; the said boxes closely fitting the jaws, and closing in upon and to the ring or circle of the shackle, and then riveted through and through the box and jaws with a countersunk rivet. The object of the boxes is to prevent the convict from making the steel hardened jaws of the Gardner or other shackle cut their own rivets.

HOT AIR FURNACE.—Wilmot W. Dodge, Boston, Mass.—This invention consists in a hot air chamber and cold air chamber, separated by a partition, having dampers when applied to a hot air furnace, and also pipes passing through the combustion chamber, whereby fuel is greatly economized.

HOISTING ATTACHMENT FOR THE SHAFTS OF WELL AUGERS.—Henry H. Russell, Maysville, Mo.—The invention consists in providing the shaft of the auger with a collar, band, and pivoted arm. The collar is keyed or otherwise securely attached to the shaft. Upon the collar is placed an open band to the ends of which is pivoted the end of an arm, to which arm is attached the lower end of the rope, by which the auger is raised and lowered. The arm, when the auger is being turned, hangs down and thus keeps the rope from being wound upon the shaft, so that it is always ready to raise the auger when required.

PERFUMED OPERA CHAIN.—Solomon Fredrick, New York city.—This invention relates to a method of perfuming jewelry by attaching thereto a vessel or tube closed at one end and containing a piece of sponge saturated with perfume. The open extremity of this reservoir is surmounted by a perforated cover.

BINDERS' ATTACHMENT FOR HARVESTER.—Chauncey G. Price, Amana, Iowa.—The grain, as it falls by the sickles, is caught by a platform, up an upward extension of which it is swept by a rake. It then passes to an inclined plane down which it slides to the trough, from which it is removed by the binders. The platform upon which the binders stand is bolted to the frame work of the reaper. The binder's tables, upon which the grain is laid by the binders to be bound, are attached to the platform; the gavels may thus be conveniently bound before being dropped from the machine.

DOG MUZZLE.—Charles de Quilfeldt, New York city.—This invention consists in having the portion of the frame of the muzzle under the lower jaw to spring downward and allow the dog to open his mouth as widely and nearly as freely as when unmuzzled, the spring returning the said part of the frame again as the mouth closes.

CIDER MILL.—John McGrew, Ravenswood, West Va.—The invention consists in a cider mill which crushes the apples, conveys the pumice through an intermediate space and delivers it between two pressing rolls, where the juice is expressed, the pumice discharged and the cider conducted into a suitable receptacle.

FEED RACK.—Jabez L. Rhodeback, New Way, Ohio.—This invention relates to a new rotary feed rack, the nature of which is explained by its name. It can be turned or reversed, to be cleaned, and is so arranged that the animals can feed from the ends. The invention consists in composing the rack of rods, which cross a horizontal beam or scantling, and form four racks of which either one can at any time be used.

MORTISING CHISEL.—Lawrence S. Shuler and James Carpenter, of Jeffersonville, Ind.—This invention relates to that class of chisels so made as to draw out of a mortise the chips and shavings which it detaches from the the block. The invention consists in providing the chisel with a roughened or grooved inner face and with similarly roughened lips or side flanges.

LATH MACHINE.—Oliver C. Meigs, Dubuque, Iowa.—This invention consists of a combination of a pair of toothed drawing or feeding disks or rollers with a pair of bolting saws and the ordinary feed rollers; said toothed rollers are suspended by an oblique frame from an axis over the saws, so as to work on the upper sides of the cut bolts and rise and fall with the irregularities of the surfaces of the slabs, said rollers being driven by machine chains worked by drums on the axis, from which the roller-supporting frame is suspended, and said chains are inclosed in cases to prevent them from being clogged with saw dust. The said swinging frame or support for the rollers has chains or links connecting its lower end with a support above, to prevent the rollers from falling too low when the bolts pass from under them.

SCREW DRIVER.—John S. Armstrong, St. John, Canada.—This invention consists of a split or divided plate or bar, whose ends for entering the nick of the screw are each in the form of a frustum of a wedge, arranged so that the narrow ends meet when the two parts, which are capable of moving toward and from each other, come together; with which said divided bar is a handle, and a suitable means for forcing the said wedge ends together when applied to the screw. The said improved screw driver is designed especially for screws with nicks widest at the ends and contracting toward the middle, the object being to hold the screw on the driver by wedging the latter into the nick, so that the screws may be guided by the driver, and the latter will be prevented from slipping off the screws while turning them, as does the common screw driver.

[OFFICIAL.]

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6,098.—WATCH BRIDGE.—J. L. Mathey, Hoboken, N. J.
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6,116.—MUCILAGE BOTTLE.—H. S. Adams and B. Fay.
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976.—SUGAR CURED HAMS, ETC.—H. Ames & Co., St. Louis, Mo.
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Applications have been duly filed, and are now pending, for the extension of the following Letters Patent. Hearings upon the respective applications are appointed for the days hereinafter mentioned:

22,232.—HORSE RAKE.—C. Garver. Nov. 20, 1872.
22,311.—LAMP SHADE SUPPORTER.—W. F. Shaw. Nov. 27, 1872.
22,436.—FRUIT CAN.—W. W. Lyman. Dec. 11, 1872.
22,572.—SPECTACLE FRAME.—T. Noel. Dec. 26, 1872.

EXTENSIONS GRANTED.

17,236.—COUPLING FOR SHAFTING.—W. and C. Sellers.
21,391.—ATTACHING PROPS OF CARRIAGE BOWS.—D. B. Wright, L. Sawyer.
21,416.—COFFEE ROASTER.—T. Heerman.
21,436.—COUCH FOR RAILROAD CAR.—F. R. Myers and F. H. Furniss.
21,443.—MACHINE FOR TURNING HUBS.—A. Rickart.
21,464.—MANUFACTURE OF BRUSHES.—S. Barnes.
21,474.—JOURNAL BOX.—H. H. Thayer.
21,540.—HARVESTER AND BINDER.—A. Sherwood.
21,541.—PIN STICKING MACHINE.—C. W. Van Vliet.

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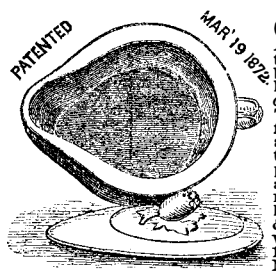

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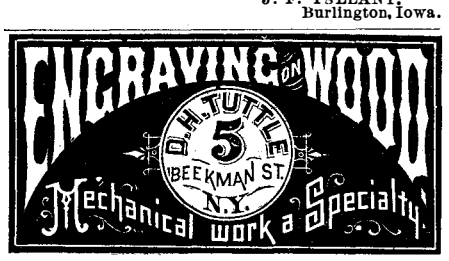

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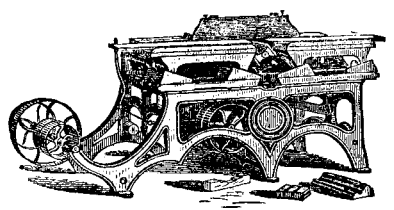

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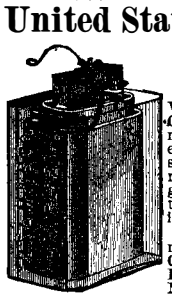

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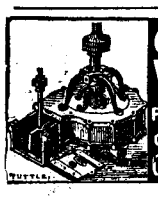

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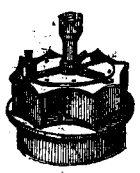

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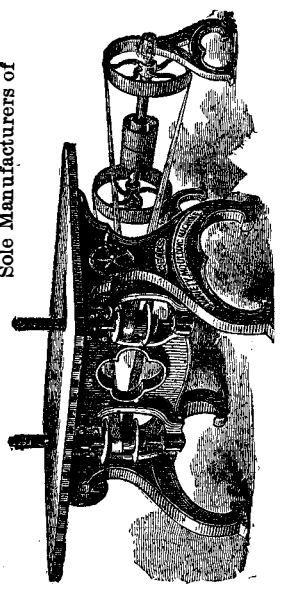

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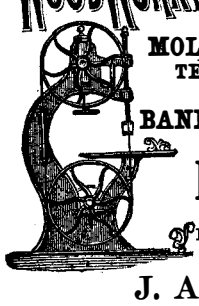

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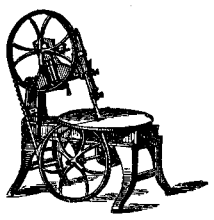

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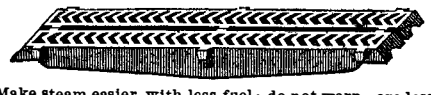

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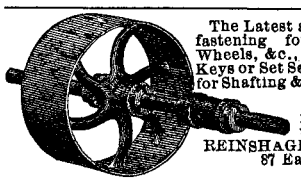

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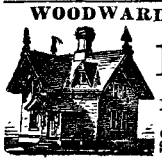

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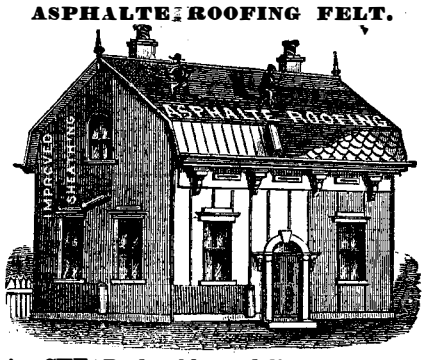

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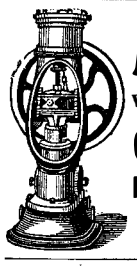

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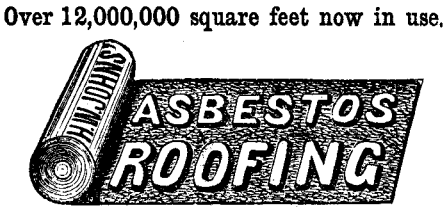

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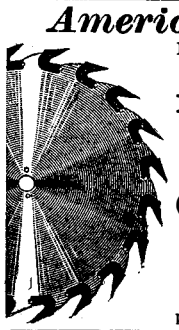

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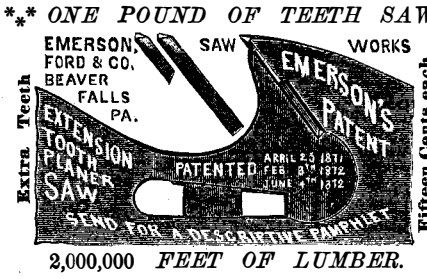
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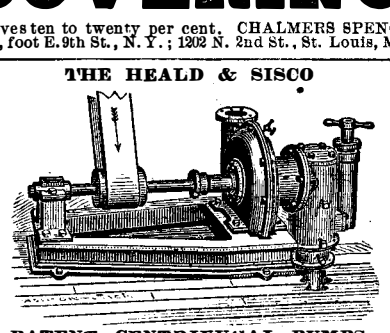

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